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# Report on the individual review of the annual submission of Poland submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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# I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Poland, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 22 to 27 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Domenico Gaudioso (Italy); energy – Ms. Kristien Aernouts (Belgium), Ms. Diana Barba (Colombia) and Mr. Sangay Dorji (Bhutan); industrial processes and solvent and other product use – Mr. Mejouer Boughedaoui (Algeria) and Mr. David Kuntze (Germany); agriculture – Mr. Daniel Bretscher (Switzerland) and Mr. Jacques Kouazounde (Benin); land use, land-use change and forestry (LULUCF) – Ms. Rehab Ahmed Hassan (Sudan), Ms. Thelma Krug (Brazil), Mr. Eiichiro Nakama (Japan) and Ms. Sekai Ngarize (United Kingdom of Great Britain and Northern Ireland); and waste – Ms. Anke Herold (European Union) and Ms. Violeta Hristova (Bulgaria). Mr. Boughedaoui and Mr. Gaudioso were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Poland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Poland was published after 15 April 2014, which may have affected the Party's ability to implement recommendations and encouragements made in the previous review report.

3. All recommendations and encouragements included in this report are based on the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the 2015 annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Poland was carbon dioxide ($CO_2$), accounting for 80.4 per cent of total GHG emissions[1] expressed in $CO_2$ equivalent ($CO_2$ eq), followed by methane ($CH_4$) (10.3 per cent) and nitrous oxide ($N_2O$) (7.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride ($SF_6$) collectively accounted for 1.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.1 per cent of total GHG emissions, followed by the agriculture sector (9.2 per cent), the industrial processes sector (6.7 per cent), the waste sector (3.8 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 399,267.97 Gg $CO_2$ eq and decreased by 30.0 per cent between the

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of $CO_2$ eq excluding LULUCF, unless otherwise specified.

base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

5. Tables 1 and 2 show GHG emissions from categories included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1988 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

Table 1

**Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012**

| | | | *Gg $CO_2$ eq* | | | | | | | *Change (%)* |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Greenhouse gas* | *Base year* | *1990* | *1995* | *2008* | *2009* | *2010* | *2011* | *2012* | *Base year–2012* |
| Annex A sources | | $CO_2$ | 469 413.91 | 374 812.04 | 360 975.63 | 324 146.03 | 310 278.97 | 329 622.49 | 327 722.76 | 320 861.67 | −31.6 |
| | | $CH_4$ | 55 875.20 | 49 651.04 | 45 753.23 | 41 832.92 | 40 714.64 | 41 287.30 | 40 502.62 | 41 032.63 | −26.6 |
| | | $N_2O$ | 44 487.31 | 41 786.00 | 33 997.36 | 33 908.27 | 30 139.77 | 29 715.86 | 30 030.81 | 29 589.58 | −33.5 |
| | | HFCs | 197.03 | NA, NO | 197.03 | 6 019.53 | 6 468.37 | 6 755.80 | 7 394.47 | 7 700.22 | 3 808.2 |
| | | PFCs | 148.96 | 122.88 | 148.96 | 139.85 | 59.24 | 56.13 | 49.88 | 41.81 | −71.9 |
| | | $SF_6$ | 30.53 | NA, NO | 30.53 | 34.46 | 39.42 | 37.07 | 40.90 | 42.06 | 37.8 |
| KP-LULUCF | Article 3.3[b] | $CO_2$ | | | | −1 989.65 | −2 046.23 | −2 232.28 | −2 289.22 | −2 491.14 | |
| | | $CH_4$ | | | | 0.89 | 1.36 | 0.71 | 0.81 | 2.48 | |
| | | $N_2O$ | | | | 0.20 | 0.31 | 0.16 | 0.18 | 0.57 | |
| | Article 3.4[c] | $CO_2$ | NA | | | −36 479.47 | −35 103.04 | −34 400.23 | −40 690.92 | −36 762.96 | NA |
| | | $CH_4$ | NA | | | 12.43 | 18.10 | 9.01 | 9.76 | 28.83 | NA |
| | | $N_2O$ | NA | | | 315.80 | 317.43 | 315.65 | 316.14 | 320.83 | NA |

*Abbreviations*: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1988 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1988. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
**Greenhouse gas emissions by sector and activity, base year[a] to 2012**

| | | | Gg $CO_2$ eq | | | | | | | Change (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sector | Base year | 1990 | 1995 | 2008 | 2009 | 2010 | 2011 | 2012 | Base year–2012 |
| Annex A sources | Energy | 467 445.46 | 374 281.29 | 362 121.61 | 321 668.53 | 310 193.64 | 329 242.00 | 324 731.47 | 319 657.56 | –31.6 |
| | Industrial processes | 33 194.21 | 24 448.63 | 24 388.49 | 29 570.42 | 23 683.73 | 25 092.04 | 27 783.33 | 26 958.32 | –18.8 |
| | Solvent and other product use | 1 006.46 | 629.23 | 562.59 | 797.18 | 751.41 | 779.40 | 786.71 | 759.67 | –24.5 |
| | Agriculture | 55 740.10 | 54 327.99 | 41 085.94 | 38 859.60 | 37 741.80 | 37 078.80 | 37 328.84 | 36 653.86 | –34.2 |
| | Waste | 12 766.70 | 12 684.82 | 12 944.09 | 15 185.33 | 15 329.84 | 15 282.41 | 15 111.08 | 15 238.55 | 19.4 |
| | LULUCF | NA | –25 506.48 | –14 289.80 | –30 879.88 | –29 642.90 | –29 153.97 | –35 617.53 | –31 854.64 | NA |
| | **Total (with LULUCF)** | **NA** | **440 865.48** | **426 812.92** | **375 201.19** | **358 057.51** | **378 320.68** | **370 123.91** | **367 413.33** | **NA** |
| | **Total (without LULUCF)** | **570 152.94** | **466 371.96** | **441 102.72** | **406 081.06** | **387 700.41** | **407 474.65** | **405 741.44** | **399 267.97** | **–30.0** |
| | Other[b] | | | | | | | | | |
| KP-LULUCF | Article 3.3[c] Afforestation and reforestation | | | | –2 339.17 | –2 420.36 | –2 554.16 | –2 641.66 | –2 777.73 | |
| | Article 3.3[c] Deforestation | | | | 350.62 | 375.80 | 322.76 | 353.44 | 289.64 | |
| | **Total (3.3)** | | | | **–1 988.55** | **–2 044.55** | **–2 231.40** | **–2 288.23** | **–2 488.09** | |
| | Article 3.4[c] Forest management | | | | –36 151.23 | –34 767.50 | –34 075.58 | –40 365.01 | –36 413.31 | NA |
| | Article 3.4[c] Cropland management | NA | | | NA | NA | NA | NA | NA | NA |
| | Article 3.4[c] Grazing land management | NA | | | NA | NA | NA | NA | NA | NA |
| | Article 3.4[c] Revegetation | NA | | | NA | NA | NA | NA | NA | NA |
| | **Total (3.4)** | **NA** | | | **–36 151.23** | **–34 767.50** | **–34 075.58** | **–40 365.01** | **–36 413.31** | **NA** |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1988 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1988. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.



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# II. Technical assessment of the annual submission

## A. Overview

### 1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 11 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1988–2012 and an NIR. Poland further submitted revised CRF tables and a revised NIR on 27 May 2014. The Party also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 11 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Poland submitted revised emission estimates on 13 October 2014 in response to the list of potential problems and further questions raised by the ERT (see paras. 125 and 126 below). The values used in this report are those submitted by Poland on 13 October 2014.

9. The list of other materials used during the review is provided in annex II to this report.

### 2. Question(s) of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

### 3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Poland. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
**The expert review team's overall assessment of the annual submission**

| *Issue* | *Expert review team assessment* | *General findings and recommendations* |
|---|---|---|
| The ERT's findings on completeness | | |
| Annex A sources[a] | Complete | Mandatory: none |
| | | Non-mandatory: $CO_2$ emissions from coal mining and handling (underground and surface coal mining); and $CO_2$ emissions from glass and ceramics production (1988–2004) |
| | | Please see paragraphs 23, 54 and 55 below for category-specific findings |
| | | The ERT encourages the Party to estimate and report emissions from all non-mandatory categories |

| *Issue* | *Expert review team assessment* | *General findings and recommendations* |
|---|---|---|
| Land use, land-use change and forestry[a] | Not complete | Mandatory: while AD are reported, "NO" is reported for the carbon stock changes in grassland converted to cropland (except for the soil pool), cropland converted to grassland (except for the soil pool) and wetlands converted to settlements (see paras. 79 and 83 below)<br><br>The ERT recommends that the Party estimate and report the carbon stock changes from all mandatory categories<br><br>Non-mandatory: none |
| KP-LULUCF | Complete | |
| The ERT's findings on recalculations and time-series consistency | | |
| Transparency of recalculations | Sufficiently transparent | Recalculations due to the continuous improvement of methodologies and AD, together with those made in response to the review process, are reported in the NIR and in CRF table 8(b)<br><br>Please see paragraphs 22, 29, 41, 42, 43, 60, 78 and 103 below for category-specific findings |
| Time-series consistency | Sufficiently consistent | The time series are generally consistent with the exception of some estimates, particularly for the LULUCF and industrial processes sectors<br><br>Please see paragraphs 25, 29, 33, 39, 47, 57, 58, 80, 87 and 89 below for category-specific findings |
| The ERT's findings on QA/QC procedures | Sufficient | Poland has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. However, the ERT still noted several mistakes and therefore reiterates the previous recommendation that Poland enhance the verification and QA/QC procedures to avoid inconsistencies between the information in the NIR and in the CRF tables and errors in the data input<br><br>Please see paragraphs 25, 62, 63, 70, 73, 80 and 108 below for category-specific recommendations |
| The ERT's findings on transparency | Sufficiently transparent | The ERT noted the improvements in the transparency compared with the previous submission. However, the NIR still does not |

| *Issue* | *Expert review team assessment* | *General findings and recommendations* |
|---|---|---|
| | | provide sufficient information on estimation methods for some categories (particularly in the industrial processes and LULUCF sectors). The ERT recommends that Poland continue to improve the transparency of the NIR by including, in the sectoral chapters of the NIR, more detailed information concerning the sources of AD and EFs, applied recalculations and QA/QC and verification procedures.<br><br>Please see paragraphs 24, 25, 36, 45, 49, 50, 52, 53, 57, 65, 67–69, 72, 76, 81, 82, 86, 95, 98, 99, 101, 107, 110 and 121 below for category-specific recommendations. |

*Abbreviations*: AD = activity data, Annex A sources = source categories included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, EF = emission factor, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

### 4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR described the national system for the preparation of the inventory. As indicated by the Party, there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Poland submitted in 2013,[1] remains relevant.

13. In the review of the 2013 annual submission, the ERT recommended that Poland enhance the description of its institutional arrangements for the preparation, peer review and approval of the national inventory. The ERT noted that, despite the addition of a flow chart summarizing the structure of the national inventory system, the roles and functions are not clarified in the main report; however, annex 7 dealing with the quality assurance/quality control (QA/QC) plan provides additional information on the institutional arrangements of the national system. The ERT recommends that the Party summarize the above information in the description of the institutional arrangements in chapter 1.2 of the NIR. The ERT further noted that neither annex 7 nor chapter 10.4 (on recalculations, including in response to the review process, and planned improvements to the inventory) of the NIR contain any references to an inventory improvement plan. The ERT reiterates the encouragement from the previous review report that Poland develop a national inventory improvement plan and a timeline for its implementation and annually review the progress of the implementation of the inventory improvements and update the inventory improvement plan.

[1] FCCC/ARR/2013/POL, paragraph 11.

Inventory preparation

14. Table 4 contains the ERT's assessment of Poland's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
**Assessment of inventory preparation by Poland**

| *Issue* | *ERT assessment* | *ERT findings and recommendations* |
|---|---|---|
| *Key category analysis* | | |
| Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF? | Yes | Level and trend analysis performed, including and excluding LULUCF |
| Approach followed? | Tier 1 | Poland provided a draft tier 2 key category assessment during the review. The Party informed the ERT that it is planning to incorporate tier 2 and tier 1 results in a single annex to the NIR in the next annual submission. The ERT commends the Party for the planned improvements and encourages Poland to submit the tier 2 analysis as planned |
| Were additional key categories identified using a qualitative approach? | No | The Party informed the ERT that it is planning to introduce a qualitative approach to identify key categories in its next annual submission |
| Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory? | Yes | |
| Does the Party use the key category analysis to prioritize inventory improvements? | Yes | |
| *Assessment of uncertainty analysis* | | |
| Approach followed? | Tier 1 | See paragraph 17 below |
| Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF? | No | See paragraphs 15, 16, 64 and 82 below |

| *Issue* | *ERT assessment* | *ERT findings and recommendations* |
|---|---|---|
| Quantitative uncertainty (including LULUCF) | Level = 5.5%<br>Trend: $CO_2$ = 1.7%, $CH_4$ = 4.9%, $N_2O$ = 1.4% | |
| Quantitative uncertainty (excluding LULUCF) | Level = 4.6%<br>Trend: $CO_2$ = 1.5%, $CH_4$ = 4.9%, $N_2O$ = 1.4% | |

*Abbreviations:* ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

15. The ERT noted some improvements in the uncertainty assessment reported by the Party, namely the inclusion of the overall quantitative uncertainty values for the inventory with and without LULUCF in the NIR and using 1988 as the base year for the assessment. However, some of the recommendations from the previous review report concerning the provision of the overall uncertainty for the trend (now provided by gas), the inclusion of the uncertainty of the KP-LULUCF activities and a description of how the uncertainty assessment results were used to prioritize the inventory improvements have still not been addressed in the 2014 inventory submission. The ERT reiterates these recommendations.

16. The uncertainties for emissions of fluorinated gases (F-gases) do not distinguish between the activity data (AD) and emission factors (EFs). In response to a question raised by the ERT during the review, the Party reported on the work undertaken to improve the quality of the data, which is expected to provide the necessary input data for the uncertainty assessment. In particular, this should allow Poland to assign values independently to the AD and EFs for F-gases, rather than relying on a single value for the emissions. The ERT welcomes this information and reiterates the recommendation made in previous review reports that Poland improve the uncertainty data for F-gases and that the Party, in its next annual submission, report the uncertainty analysis in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

17. Poland explained in the NIR its plans to finalize its tier 2 uncertainty analysis using Monte Carlo simulations for the next annual submission. In response to questions raised by the ERT during the review, the Party provided a draft report on the tier 2 Monte Carlo uncertainty assessment of the Polish GHG inventory for 2012. The ERT welcomes the document submitted by Poland and encourages the Party to provide the results of the study in its next NIR, together with detailed information at the category level.

Inventory management

18. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Poland submitted in 2013,[4] remains relevant.

[4] FCCC/ARR/2013/POL, paragraph 16.

### 5. Follow-up to previous reviews

19. The ERT noted that Poland continues to improve its inventory submissions and some of the improvements undertaken by the Party were made in response to the recommendations made in the previous review reports. The ERT commends Poland for the improvements undertaken thus far, and encourages the Party to implement the others that are still in the preparation phase (such as the tier 2 key category assessment and the tier 2 uncertainty assessment) in its next annual submission.

20. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

## B. Energy

### 1. Sector overview

21. The energy sector is the main sector in the GHG inventory of Poland. In 2012, emissions from the energy sector amounted to 319,657.56 Gg $CO_2$ eq, or 80.1 per cent of total GHG emissions. Since 1988, emissions have decreased by 31.6 per cent. The key drivers for the fall in emissions are primarily the shift from a centrally planned to a market economy, which led to a restructuring of (mainly heavy) industry in the late 1980s to early 1990s, and, secondarily, the additional increases in energy efficiency, which took effect throughout the 1990s. Within the sector, 53.1 per cent of the emissions were from energy industries, followed by 17.6 per cent from other sectors, 14.6 per cent from transportation and 9.7 per cent from manufacturing industries and construction. Fugitive emissions from solid fuels accounted for 2.9 per cent and fugitive emissions from oil and natural gas accounted for the remaining 2.1 per cent.

22. Poland has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Poland between the 2013 and 2014 annual submissions were in the following categories: fugitive emissions from solid fuels, transport and manufacturing industries and construction. The recalculations were made following changes in AD from the European Statistical Authority (Eurostat) and owing to the reallocation of emissions from the industrial processes sector (see para. 41 below). Compared with the 2013 annual submission, the recalculations decreased emissions in the energy sector by 485.63 Gg $CO_2$ eq (0.1 per cent) and decreased total national emissions for 2011 by 0.1 per cent. The recalculations were generally adequately explained (see para. 24 below).

23. Poland's GHG inventory for the energy sector is complete in terms of mandatory categories. However, the ERT noted that some estimates have been reported as "NE" (not estimated) in CRF table 1.B.1, such as $CH_4$ recovery/flaring and $CO_2$ emissions from underground and surface coal mining. During the review, Poland indicated that an analysis is under way to attempt to utilize the emission data reported by underground coal mines and other entities to a national database. The ERT reiterates the encouragement in the previous review report that Poland continue its efforts to collect data for $CH_4$ recovery/flaring and $CO_2$ emissions from coal mines.

24. The transparency of the NIR has improved compared with the previous annual submission, particularly by improving the reference to the EFs used in the estimates, for example the provision of a detailed section on the approach used to derive the country-specific EFs for hard and lignite coal, and the splitting of biogas consumption in the energy and waste sectors. However, the ERT considers that the transparency of the description of the methods used to estimate fugitive emissions is still limited. The ERT therefore recommends that Poland improve the description in the next NIR.

25. Poland uses three main sources of AD in the energy sector. The primary source of energy data for the time series is the Polish energy balances, which are developed through national surveys conducted by the Central Statistical Office of Poland (GUS). Since 1990, these data are reported and recorded by Eurostat. For 1988 and 1989, however, the energy data have been obtained from the International Energy Agency (IEA), since no data for Poland are available in the Eurostat database prior to 1990. From 2005 onwards, some data reported under the European Union Emissions Trading System (EU ETS) have also been incorporated into the data used in the inventory. The ERT commends Poland for providing brief descriptions in the NIR of uncertainties and time-series consistency, source-specific QA/QC and verification procedures, recalculations and planned inventory improvements related to AD, as recommended in the previous review reports. The ERT recommends that Poland elaborate on the descriptions to improve transparency in relation to how the Party maintains time-series consistency while using the different sources of AD. The ERT reiterates the previous recommendation that Poland improve the reporting of the details of the annual QA/QC measures implemented in the energy sector and provide information on the cross-checks made between the national statistics data, the Eurostat data and the EU ETS data, as well as information on any validations of EFs by comparison with the EU ETS data.

26. The ERT commends Poland for the improvements made in the 2014 annual submission compared with the previous annual submission by: providing explanations of the methods used to derive the country-specific $CO_2$ EFs for coal and lignite, and the $CO_2$ EFs for road transportation in the NIR; reporting detailed energy data for all fuels, along with the energy-based country-specific EFs for certain fuels, for the whole time series in the NIR; and improving the estimation of emissions from aviation and navigation.

## 2. Reference and sectoral approaches

27. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 28–31 below.

Table 5
**Review of reference and sectoral approaches**

| *Issue* | *Expert review team assessment* | *Paragraph cross references* |
|---|---|---|
| Difference between the reference approach and the sectoral approach | Energy consumption: 33.23 PJ, 0.96%<br>$CO_2$ emissions: 95.15 Gg $CO_2$, 0.03% | |
| Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables? | No | See paragraph 28 below |
| Are differences with international statistics adequately explained? | Yes | |
| Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines? | No | See paragraphs 29 and 30 below |
| Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines? | No | See paragraph 31 below |

*Abbreviations:* CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories"

Comparison of the reference approach with the sectoral approach and international statistics

28. $CO_2$ emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2012, there is a difference of 0.03 per cent in the $CO_2$ emission estimates between the reference approach and the sectoral approach. Inter-annual fluctuations in the estimates using the two methods were much higher in the previous years of the time series, reaching 5.6 per cent in 1990 and 2.9 per cent in 2011. Explanations of the difference between the approaches have not been provided in the documentation box of CRF table 1.A(c), but are discussed in the NIR. The Party explained that the inter-annual fluctuations could be caused by statistical differences, distribution losses, differences in net calorific values, and the allocation of certain emission estimates to other sectors. The ERT reiterates the recommendation made in the previous review report that Poland include the explanation in the documentation box of CRF table 1.A(c) and in the NIR when the difference between both approaches is larger than 2 per cent. The ERT further encourages Poland to investigate and report specific causes of the inter-annual fluctuations between the approaches across the time series to improve the transparency of the inventory.

International bunker fuels

29. For the years 1988–2011, Poland has assumed that 95.0 per cent of total fuel consumed in aviation is for international aviation, which is in line with the information from the European Organization for the Safety of Air Navigation (EUROCONTROL) provided in the NIR (page 46). For 2012, the estimates are based on data from the energy balance, which has introduced a split between domestic and international aviation for the first time for 2012 (fuel consumption of 96.7 per cent for international aviation versus 3.3 per cent for domestic aviation). In response to a question raised by the ERT during the review, Poland reaffirmed that further efforts are to be undertaken to develop a method to split the domestic and international aviation for the years prior to 2012 to maintain time-series consistency. The ERT commends Poland for the improved AD and recommends that the Party explain, if appropriate, any recalculations made to the emissions for the years 1988–2011 that have been undertaken to ensure time-series consistency in accordance with the IPCC good practice guidance.

30. The ERT noted that insufficient information was provided in the NIR to support the distribution of emissions between domestic and international navigation. In response to a question raised by the ERT during the review, Poland explained that the fuel split is based on statistical data on the size of the international and domestic shipping activities (cargo traffic) at seaports. The ERT reiterates the recommendation made in the previous review report that Poland include information on the split in its NIR and provide details of the trend in international and domestic bunker fuel use across the time series.

Feedstocks and non-energy use of fuels

31. The ERT noted that Poland has not yet addressed the recommendations from the previous review reports that the Party complete the additional information tables to CRF table 1.A(d), explain where the associated $CO_2$ emissions are allocated or subtracted and explain how double counting is avoided. Poland has estimated the emissions from feedstocks and non-energy use of fuels for lubricants and paraffin waxes and reported them under the industrial processes sector (CRF table 2(I).A-G; category other). However, the ERT noted that it is difficult to clearly track the AD and emissions in the CRF tables for the industrial processes sector. In response to a question raised by the ERT during the review, Poland explained that the $CO_2$ emission value provided in CRF table 2(I).A-G (1,132.41 Gg

for 2012) covers the sum of emissions from fuels used as feedstock and non-energy use, and provided the AD used in the estimate (56,280 TJ). The Party further indicated that the AD will be specified in the next annual submission. However, the value reported under other (industrial processes) for $CO_2$ emissions differs from the total associated emissions, as well as from the sum of lubricants and paraffin wax, provided in CRF table 1.A(d). The ERT strongly recommends that Poland further clarify its explanation in the CRF tables and in the NIR and provide detailed information on the allocation of the emissions linked to the fuels used as feedstock and non-energy use in the inventory.

### 3. Key categories

Stationary combustion: all fuels – $CO_2$ and $CH_4$

32. Poland predominantly uses IPCC default EFs for the fuels under the stationary combustion categories in the energy sector, except for the $CO_2$ EFs for solid fuels. In response to a question raised by the ERT during the review, Poland explained that for the time being, country-specific EFs have been established only for the most significant fuels used in the energy sector (i.e. coal and lignite), and that the progress on the elaboration of country-specific EFs for other fuels would depend on the availability of funds for additional expertise and related measurements. Given that the category stationary combustion – solid, liquid, gaseous and other fuels ($CO_2$ emissions) is key, the ERT reiterates the recommendation made in the previous review report that Poland complete and report on the planned development of country-specific EFs, in accordance with the IPCC good practice guidance, for the significant fuels in the energy sector, and consider applying the country-specific $CO_2$ EF for gasoline used in road transportation also for stationary combustion.

33. In the 2014 annual submission, the ERT noted that the same value for the $CO_2$ implied emission factor (IEF) for the subcategory public electricity and heat production (other fuels) was used for the period 1990–2007 (140.14 t/TJ) and that the value for 2012 (125.65 t/TJ) is 10.3 per cent below this value and 1.1 per cent below the value for 2011 (127.09 t/TJ). In response to a question raised by the ERT during the review, Poland clarified that this was because of the use of the default EF for industrial waste at the beginning of the time series and owing to the increased share of the consumption of municipal waste in the subcategory public electricity and heat production in the later years of the time series, which has a lower EF than industrial waste. The ERT noted that this was not adequately explained in the NIR and therefore recommends that Poland include information on the trend, together with the necessary data sheets, in the NIR of the next annual submission.

34. The ERT noted that Poland has used tier 1 methods to estimate $CH_4$ emissions from stationary combustion (solid fuels) and stationary combustion (biomass) and that these categories are identified as key (based on trend) in the key category analysis performed by the Party for 2012 (NIR, page 39). The IPCC good practice guidance states (decision tree, page 2.38) that a tier 2 approach (using at least default tier 2 EFs) should be followed for these key categories. Therefore, the ERT reiterates the recommendation from the previous review report that Poland apply tier 2 methods and include any additional information on the methods used in the NIR.

Road transportation: liquid fuels – $CO_2$

35. With respect to the $CO_2$ EFs used for road transportation, previous review reports recommended that Poland clarify how the EF for gasoline is derived for each year of the time series (i.e. the method used to determine the carbon content), report in the NIR on the types of gasoline and the amounts sold, and explain the differences in the values of the IEFs for diesel fuel. In the 2014 annual submission, Poland has provided further explanation of the method and $CO_2$ EFs in section 3.2.8 of the NIR. The ERT commends the Party for the

additional documentation provided in the NIR following the recommendation made in previous review reports.

Oil and natural gas – $CO_2$, $CH_4$ and $N_2O$[5]

36. The ERT noted that Poland continues to use the notation key "NA" (not applicable) to report AD and emissions from other leakages in the residential and commercial sectors in CRF table 1.B.2 and asked for further clarification from the Party. In response to a question raised by the ERT during the review, Poland clarified that all emissions related to the transport of gas in networks (including the residential and commercial sectors) are included in the subcategory distribution based on data on the gas consumed and that the notation key for other leakages in the residential and commercial sectors would be changed to "IE" (included elsewhere). The ERT recommends that Poland use the correct notation key and provide adequate explanations in the NIR and in the documentation box of CRF table 1.B.2.

37. The ERT notes that Poland continues to use the notation key "NA" to report emissions from distribution of oil products, despite the recommendation in the previous review report that Poland either provide emission estimates or revise the notation key by replacing it with the relevant notation key ("NO" (not occurring), "IE" or "NE"). The ERT recommends that the Party consider the issue raised in this paragraph in the context of the 2015 annual submission.

### 4. Non-key categories

Road transportation: gaseous fuels – $CO_2$, $CH_4$ and $N_2O$

38. Poland has used the notation key "NA" in the subcategory road transportation (gaseous fuels), indicating that natural gas is not consumed. Poland further explained that data for the use of gaseous fuels in the transport sector do not exist due to the limited number of urban buses testing the new fuel and that Poland will include these AD in the national inventory as and when data become available. This was further cross-checked against the Eurostat energy balance[6] which also recorded zero consumption of natural gas in road transportation. The ERT encourages Poland to consider the issues raised in this paragraph in the context of its inventory improvement plan.

Other transportation: liquid and gaseous fuels – $CO_2$, $CH_4$ and $N_2O$

39. As already noted in the previous review report, Poland has reported $CO_2$, $CH_4$ and $N_2O$ emissions from pipeline transport emissions under the category other transportation (pipeline transport – natural gas combustion-related emissions from the operation of pump stations and maintenance of pipelines) for the years for which AD are available (1994–2012). For the years 1988–1993, these emissions are reported as "IE", "NO" and the emissions are included under the category manufacture of solid fuels and other energy industries. This results in a discontinuation of the time series between 1994 and 1995. The NIR (section 3.2.8.2.5) indicates that emissions from pipelines were at a very low level in all years prior to 2000; Poland's CRF tables report that these emissions amount to around 1 Gg $CO_2$ eq in the years 1994–1999 (e.g. 1.17 Gg $CO_2$, 0.021 Gg $CH_4$ and 0.002 Gg $N_2O$ for 1999). While noting that this would only result in a small recalculation for the years prior to 1994, the ERT reiterates the recommendation made in the previous review report that Poland ensure the consistency of the time series for this category. The ERT further

[5] $CO_2$ and $N_2O$ emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

[6] Eurostat energy balance. Available at <http://ec.europa.eu/eurostat/documents/3217494/5785109/KS-EN-14-001-EN.PDF/16c0ac97-7dd6-4694-b22d-e77a36cb4e86?version=1.0>.

reiterates the recommendation that the Party follow the guidance set out in the IPCC good practice guidance for the extrapolation of the volumes of fuel used in pipeline transport and that it recalculate the emissions for both the category other transportation and the category manufacture of solid fuels and other energy industries and explain these recalculations in its NIR.

## C. Industrial processes and solvent and other product use

### 1. Sector overview

40. In 2012, emissions from the industrial processes sector amounted to 26,958.32 Gg $CO_2$ eq, or 6.7 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 759.67 Gg $CO_2$ eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 18.8 per cent in the industrial processes sector, and decreased by 24.5 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are the decrease in iron and steel production and lime production, leading to a reduction in $CO_2$ emissions, and the implementation of $N_2O$ abatement technologies in nitric acid production from 2008 onwards. Within the industrial processes sector, 37.3 per cent of the emissions were from mineral products, followed by 28.7 per cent from consumption of halocarbons and $SF_6$, 20.9 per cent from chemical industry, 8.7 per cent from metal production and 4.2 per cent from other (associated emissions from non-energy product use). The remaining 0.04 per cent were from other production. Emissions from production of halocarbons and $SF_6$ were reported as "NA, NO".

41. Poland has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Poland between the 2013 and 2014 annual submissions was in the following subcategory: iron and steel production. The recalculation was made in response to the 2013 annual review report which recommended reallocating the emissions and fuel consumption from iron and steel production (under the industrial processes sector) to iron and steel (under the energy sector) and to improve the data for the entire time series and the methodological consistency between the periods 1988–2004 and 2005–2011. Compared with the 2013 annual submission, the recalculations decreased emissions in the industrial processes sector by 3,802.81 Gg $CO_2$ eq (12.0 per cent) and decreased total national emissions for 2011 by 0.9 per cent. The recalculations were consistently applied over the time series and the reasons for the recalculations were presented at an overall level. However, the ERT considers that the numerical information in the NIR is not sufficiently supported by an explanation of the reasons for the significant shift in the recalculations from increases of about 400–500 Gg $CO_2$ eq in the period 1988–2004 to decreases of more than 4,500 Gg $CO_2$ eq in the period 2005–2011. The ERT recommends that the Party transparently document in the NIR the impact of each change on the overall recalculation and the emission trend for a given category and its impact across the inventory in cases of cross-sectoral reallocation of emissions.

42. In addition, the Party applied a recalculation for the category limestone and dolomite use in the course of the 2013 review. The previous review report recommended that Poland include a clear description of the estimates and their revisions, together with the underlying methods, data sources and assumptions used, which was only partly followed. Although the methodological information was provided in an annex to the NIR, there are no explanations of the recalculations performed by the Party. The ERT recommends that Poland increase the transparency of the recalculations made in response to the review process.

43. Poland has also followed the recommendation made in the previous review report regarding the application of more conservative values for the calculation of F-gas emissions

from refrigeration and air conditioning. However, in table 10.5 of the NIR, there is no reference to this recalculation, although it is noted in the category-specific section on recalculations. In addition, the information provided in CRF table 8(b) is not sufficiently detailed and not completely consistent with the rationale for the recalculation provided in the NIR. The information in the NIR is not explicit with regard to the impact of each change on the recalculated values and does not explain the impact of the recalculations on the emission trend. The ERT recommends that Poland further enhance the explanations of the recalculations, including by: specifying the impact of each change on the estimates; providing information on the impact of the recalculations over the entire time series; and ensuring consistency between the information provided in the different sections of the NIR.

44. The inventory for the industrial processes sector is complete for the mandatory categories, with minor completeness issues identified for glass and ceramics production for the years 1988–2004 (see paras. 54 and 55 below).

45. The ERT noted some improvements regarding the transparency of the NIR, particularly regarding the information provided for soda ash production and use, and iron and steel production. However, the ERT noted that there is still a lack of transparency regarding the presentation of the methodological information for several categories, in particular for cement production, nitric acid production, consumption of F-gases (particularly the emissions from fire extinguishers), adipic acid production (the emissions reported for the period 1988–1993) and primary aluminium production. In response to questions raised by the ERT during the review requesting additional clarification, Poland provided the requested additional information which proved that the Party has applied the relevant IPCC methodologies supported by robust quality checks. The ERT recommends that Poland improve the transparency of the NIR for the above-mentioned categories and include the information provided during the review.

## 2. Key categories

Cement production – $CO_2$

46. In the previous review report, the ERT recommended that Poland provide the EU ETS data, country-specific methods, EFs and other background information used in the calculation of the $CO_2$ emissions from cement production, together with information on the data verification activities. In response to a question raised by the ERT during the review, Poland provided detailed information on the estimation method used under the EU ETS and the comparison of the GUS data and EU ETS data on clinker production. The ERT reiterates the recommendation made in the previous review report that the Party include this information in the next NIR.

Lime production – $CO_2$

47. In the NIR, Poland reported that $CO_2$ emissions from lime production are calculated based on AD gathered from statistical data and the default EF from the IPCC good practice guidance. However, the IPCC good practice guidance recommends (page 3.21) that for key categories Parties should calculate the EF and emissions for each type of lime. Further, in the previous review report the ERT recommended that Poland use the country-specific values for the calcium oxide (CaO) (quicklime) content of high-calcium lime, the CaO and magnesium oxide (MgO) content of dolomitic lime and the proportion of lime types (CaO/CaO.MgO ratio) and describe and clearly document the methods and equations used. In response to a question raised by the ERT during the review, Poland informed the ERT that part of the data on particular types of lime production had been collected, which had allowed the Party to introduce a tier 2 method for the years 2005–2012. For the remaining years of the time series, the collection of data is ongoing. The ERT commends Poland for

the ongoing work and recommends that the Party collect the data for the missing years and consistently implement a tier 2 method for this key category in the next annual submission.

Nitric acid production – $N_2O$

48. Poland reports in the NIR that for nitric acid production the $N_2O$ EFs for the years 2005–2011 were derived from reports provided directly from the producers. However, Poland has still not provided clear information about the data source of the AD. In response to a question raised by the ERT during the review, Poland informed the ERT that for consistency reasons the AD used are from the yearbook compiled by GUS, noting that the difference between the value for nitric acid production from GUS and from the direct reports of producers received by the National Centre for Emission Management (KOBiZE) at the National Research Institute of Environmental Protection was around 0.6 per cent for 2012. To enhance transparency, the ERT recommends that Poland report the information that for the years 2005–2011 plant-specific production data are also available and expand the information in the NIR with the information provided during the review.

Consumption of halocarbons and $SF_6$ – HFCs

49. The ERT noted the extensive recalculations undertaken for the category consumption of halocarbons and $SF_6$ in the 2012 and 2013 inventory submissions and welcomes the improvements implemented by the Party. The ERT recommends that the Party further improve the transparency of the estimates provided, as specified in paragraphs 50–53 below.

50. In CRF table 2(II), Poland uses the notation keys "IE" and "NA" to report HFC-23 and HFC-152a under the subcategory refrigeration and air-conditioning equipment, but there is no information on where these emissions are reported. In response to a question raised by the ERT during the review, Poland clarified that the notation key "IE" was used in error, and that the notation key "NO" should be used instead. The ERT noted that several other economies in transition, such as Bulgaria, Latvia, Romania and Slovakia, report emissions of HFC-23 (probably from the use of blends (e.g. R508A, R508B)) from refrigeration and air-conditioning equipment and from commercial refrigeration. Following a request by the ERT that Poland justify that these F-gases are not actually used in the country, the Polish inventory team confirmed that the blends R508A and R508B are not used in Poland. The Party explained that this was the result of a national law, which introduced very restrictive import limits for R508 (a single importer can import less than 2 kg/year) and the inclusion of R508B on the list of forbidden substances from 1 January 2016 onwards. The ERT recommends that Poland change the notation keys used in CRF table 2(II) and include the relevant analysis of the national F-gas market and an explanation for the lack of emissions in the next NIR.

51. In CRF table 2(II).F, Poland reports no separate emissions from industrial refrigeration, which were included under the categories stationary air conditioning and commercial refrigeration. In response to a question raised by the ERT during the review, the Party informed the ERT that there is no underestimation of emissions because all the data for the sector were checked against national total import and use values. Poland further informed the ERT about its plans to move to more detailed and transparent reporting in the future. The ERT welcomes this information and encourages Poland to improve transparency by reporting the emissions from industrial refrigeration separately from commercial refrigeration and stationary air conditioning.

52. In CRF table 2(II).F, for the category transport refrigeration Poland reports only emissions from HFC-134a, which was deemed unusual by the ERT. In response to a question raised by the ERT during the review, Poland explained that during the collection of data for the F-gas inventory, the use of gases other than HFC-134a was not identified for the transport categories (i.e. trailers, wagon tanks, cold rooms, cargo railway cars and tram

cars). To ensure the completeness of the data, the questionnaires sent to data users on the market were cross-checked with the data provided from importers. The ERT commends Poland for the detailed research and verification applied to the data from the questionnaires. The ERT recommends that Poland include the information provided to the ERT during the review in the next NIR, in order to improve the transparency of the reporting and demonstrate the data quality checks undertaken.

53. Poland reports that, thus far, there are no disposal emissions of HFC-134a from transport refrigeration. In table 3.22 of the IPCC good practice guidance, the best expert judgement for transport refrigeration is 6–9 years, which is lower than the lifetime of 15 years used by Poland. In response to a question raised by the ERT during the review, Poland justified the lifetime by referring to the national circumstances. The main reasons for introducing country-specific values are that transport equipment in Poland is used for a much longer period of time than in Western Europe due to economic reasons (the IPCC good practice guidance assumes that the average lifetime of a car is 12 years), and the vehicle fleet statistics confirm the use of equipment for a relatively long period of time (according to GUS, the average age of the vehicle fleet in Poland is more than 12 years). The ERT analysed the data on the lorry fleet in Poland from the United Nations Economic Commision for Europe (UNECE) statistical database showing that 63 per cent of the lorry fleet is older than 10 years. In the light of this information, the ERT agrees with the assumption for the lifetime used in the inventory of Poland. The ERT recommends that Poland include, in the NIR, the information provided to the ERT during the review to justify the lifetime used.

### 3. Non-key categories

Other (mineral products) – $CO_2$

54. Poland reports in the NIR that for the years 1988–2004 no emission data are available for $CO_2$ emissions from glass production. Poland further reports under planned improvements that further attempts to complete the $CO_2$ emissions time series are planned. The Party informed the ERT during the review that production values for glass containers, float glass and flat-drawn glass were collected for the years 1988–2012. Based on these data, the Party will attempt to estimate the emissions in the next annual submission following the methodology and EFs recommended in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The ERT commends Poland for collecting the detailed data and encourages the Party to implement the planned improvements in the next annual submission.

55. Poland reports in the NIR that for $CO_2$ emissions from ceramics production for the years 1988–2004, no emission data are available. Poland further reports under planned inventory improvements that further attempts to complete the $CO_2$ emission data set are planned. During the review process, Poland informed the ERT that, thus far, no coherent results had been obtained for the emissions from this category for the entire period, based on available data in the EU ETS and the National Database on Emissions of GHG and Other Substances. Poland has continued the analysis using the range of data provided in the national database. However, the Party informed the ERT that this task is very difficult due to the significant fragmentation of AD in this sector and the broad diversity of products in this category. The ERT encourages Poland to further investigate the different enterprises and their different products, with a view to including estimates for the entire time series in the next annual submission.

Adipic acid production – $N_2O$

56. Poland has reported $N_2O$ emissions from adipic acid production for the years 1988–1993, but there is no information in the NIR, since the subchapter for adipic acid

production is missing. Poland informed the ERT that there was only one adipic acid production plant in the country and it ceased production in 1993. The ERT recommends that Poland provide, in the next annual submission, a description of the method and data source used for the calculation of the $N_2O$ emissions from adipic acid production in a separate category-specific subchapter of the NIR.

Aluminium production – $CO_2$

57. Poland has reported $CO_2$ emissions from primary aluminium production. From 2008 (84.11 Gg) to 2009 (28.11 Gg) there is a sharp decline in the $CO_2$ emissions by −55.98 Gg, but no explanatory information on the trend has been provided in the NIR. Poland informed the ERT that the reason for the sharp drop between 2008 and 2009 is the termination of primary aluminium production by the biggest aluminium smelting plant in the country since February 2009. The ERT recommends that the Party improve the transparency of the NIR by including a trend description for primary aluminium production in the next annual submission.

$SF_6$ used in aluminium and magnesium foundries – $SF_6$

58. $SF_6$ emissions from magnesium production are reported from 1994 onwards using a constant value of 0.18 t for the period 2007–2012. In response to a question raised by the ERT during the review, Poland explained that the value reported for 2007 and the following years was derived from branch associations and considered conservative since most production related to industrial processes has decreased since 2009. In 2008 the layout of the published data changed and, since then, data on magnesium cast are not directly available. The use of new data from the Polish Geological Institute (supervised by the Ministry of Environment) is currently being explored. Following the change of data source, the applicability of the applied EF will be investigated and efforts will be made to ensure the time-series consistency of the historical data. The ERT recommends that Poland implement this new data source in the next annual submission and ensure the consistent reporting of the category across the time series, as planned.

## D. Agriculture

### 1. Sector overview

59. In 2012, emissions from the agriculture sector amounted to 36,653.86 Gg $CO_2$ eq, or 9.2 per cent of total GHG emissions. Since 1988, emissions have decreased by 34.2 per cent. The key driver for the fall in emissions is the economic transformation from a centrally planned economy to a market economy and the concomitant decrease in the livestock population and fertilizer use. Within the sector, 55.4 per cent of the emissions were from agricultural soils, followed by 24.5 per cent from enteric fermentation and 20.0 per cent from manure management. The remaining 0.1 per cent were from field burning of agricultural residues. Emissions from rice cultivation and prescribed burning of savannahs were reported as "NO, NA" and "NA".

60. Poland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Poland between the 2013 and 2014 annual submissions were in the following categories: agricultural soils and enteric fermentation. The recalculations were made following changes in AD and in order to rectify identified errors: an update of feed digestibility for dairy and non-dairy cattle as well as a correction of animal manure used in the calculation of indirect emissions from agricultural soils. Compared with the 2013 annual submission, the recalculations increased emissions in the agriculture sector by 2,399.05 Gg $CO_2$ eq (6.9 per cent) and increased total national emissions for 2011 by 0.6 per cent. The recalculations were adequately explained.

61. The information on the agriculture sector is complete with respect to categories, gases, years and geographical coverage, and is in general transparent.

62. Poland has implemented in its 2014 annual submission some of the recommendations made in the previous review report, particularly those addressing: the time-series consistency of the $N_2O$ emissions from sludge applied to fields; the revision of the explanation of the method used for agricultural soils; and the provision of an explanation of the methods used by GUS for compiling and collecting livestock population data, the QC procedures performed by GUS and the bottom-up statistical flows. However, several recommendations, mainly concerning transparency (e.g. correcting the notation key for $CH_4$ and $N_2O$ emissions in CRF table 4.F to "NO") and QA/QC procedures,[7] have not yet been addressed by the Party (see paras. 64–69, 71, 72 and 76 below). The ERT encourages Poland to include all pending recommendations from previous review reports in an inventory development plan and report on the respective progress made in future annual submissions.

63. Poland has reported in the sector-specific chapters on QA/QC in the NIR that the EFs and methodologies are compared with international literature and other countries' methods/EFs applied. The ERT welcomes these QA/QC activities and recommends that Poland document the respective main findings and report the results, particularly the reasons for any discrepancies, in the category-specific subchapters of the NIR.

64. Poland has reported category-specific uncertainty estimates in NIR chapter 6.2.3. The ERT noted that the uncertainty for the category agricultural soils (53.2 per cent) is considerably lower than would be expected by the values presented in annex 8 to the NIR (150 per cent uncertainty for the EFs) and with the ranges provided in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance. In response to a question raised by the ERT during the review, Poland explained that there was an error in the calculation formula. The ERT recommends that Poland revise the uncertainty of the $N_2O$ emissions from agricultural soils and reiterates the recommendation made in the previous review report that Poland report the assumptions and methods used to estimate the uncertainty and use methods to combine uncertainties, as provided in chapter 6.3 of the IPCC good practice guidance.

65. As in previous reviews, the ERT noted that Poland uses population data for cattle and swine at a specific reference date instead of annual mean values. In response to a question raised by the ERT during the review, Poland explained the rationale for its approach and stated that reference date population data from the summer census (June, July) are chosen mainly because there are no consistent time series for other census data. The summer census data also correspond to the data reported to the Food and Agriculture Organization of the United Nations (FAO). Furthermore, Poland clarified that the chosen approach does not lead to an underestimation of emissions since the summertime livestock population is higher in most cases than that reported in the December census (and March census for swine). Based on detailed data provided by Poland during the review the ERT could confirm that the summer census data are on average 5 per cent higher than the December and March data. The ERT considers that the approach chosen by Poland is in line with the IPCC good practice guidance. However, the ERT reiterates the recommendation made in the previous review report that Poland provide a transparent explanation for the use of specific livestock census statistics and further recommends that Poland include the additional information provided during the review in the NIR of the next annual submission.

[7] FCCC/ARR/2013/POL, paragraphs 73 and 78.

## 2. Key categories

Enteric fermentation – $CH_4$

66. In the previous review report, the ERT recommended that Poland include a more detailed description of the initial data (e.g. average weight, weight gain, feeding method and wool production), methods and assumptions used to derive the gross energy intake values by livestock subcategory. In response to a question raised by the ERT during the review, Poland explained that most of the values are already available in the CRF tables and provided lists of the parameters used for cattle and sheep. Furthermore, Poland informed the ERT that it is planning to include additional information in the next NIR. The ERT recommends that the Party implement the planned improvement.

67. Poland reports in CRF table 4.A a body weight of dairy cattle of 500 kg (used to define the country-specific EFs), which is below the default value of 550 kg provided in table A-1 (page 4.31) of the Revised 1996 IPCC Guidelines. In response to a question raised by the ERT during the review, the Party provided a detailed explanation stating, among others, that in Poland small milk farms still dominate, for which genetic progress is too expensive. Accordingly, most farmers decide to cross/mix existing cattle with the Holstein-Friesian (KF) breed rather than purchase pure breed cattle. Most of the domestic dairy cattle population is based on the Polish Black-White breed, Simmental and Jersey, characterized by a lower body mass than Holstein-Friesian. Furthermore, Poland stated that the Institute of Animal Production anticipates introducing two new categories of dairy cattle (400 kg and 600 kg) in the statistical survey within the next three years. The ERT recommends that Poland increase the transparency of its reporting by providing data justifying the lower body weight of dairy cattle used in the inventory.

68. In CRF table 4.A, Poland reports a $CH_4$ conversion rate ($Y_m$) of 7 per cent for sheep. In response to a question raised by the ERT during the review, Poland explained that for the calculation of $CH_4$ emissions from enteric fermentation for sheep, the $Y_m$ is 6 per cent for young sheep and 7 per cent for mature sheep following table 4.9 of the IPCC good practice guidance. The ERT recommends that Poland report a weighted $Y_m$ for sheep in the CRF tables and provide a respective explanation in the NIR.

Manure management – $CH_4$ and $N_2O$

69. In the NIR (pages 162 and 173), Poland mentions that the share of the "pasture, range and paddock" animal waste management system has been decreasing since 1990. Furthermore, in the previous review report, the ERT recommended that Poland provide a detailed explanation of the methods used for the estimation of manure allocation per animal waste management system in the NIR. However, the ERT considers that the information provided in the 2014 NIR has not substantially improved. In response to a question raised by the ERT during the review, Poland explained that the database containing data on specific animal waste management systems at the livestock subcategory level starts in 2004 only. Due to the lack of data at the same level of disaggregation for the entire time series since 1988, further specification of the livestock subcategories has not yet been undertaken. Accordingly, the ERT reiterates the recommendation made in the previous review report that Poland provide additional information that justifies the distribution of animal waste management systems used (including, for example, information on general agricultural structures and policies). Additionally, the ERT encourages Poland to use all available disaggregated data on animal waste management system allocation in future annual submissions.

70. The ERT found that the data on the allocation of animal waste management systems in CRF table 4.B(a)s2 have not been correctly transcribed. The values are $10^{15}$ and $10^{16}$ times higher than they should be. The ERT recommends that Poland check any possible related software problems and report the correct values in its next annual submission.

71. In the previous review report, the ERT recommended that Poland include the anaerobic digester animal waste management system in the estimation of $CH_4$ emissions from cattle and swine manure management. In response to a question raised by the ERT during the review, Poland explained that an initial analysis has been carried out but a more comprehensive analysis and collection of additional data are still needed. Poland also stated that, currently, emissions related to biogas combusted in agricultural biogas plants are accounted for in the energy sector but are not discounted under manure management, which leads to an overestimation of emissions. The Polish inventory team will continue its efforts to resolve this issue. The ERT welcomes these planned improvements and reiterates the recommendation made in the previous review report that Poland separately report $CH_4$ emissions from anaerobic digesters.

72. During the 2013 annual review, the ERT found that the division of swine into subcategories used to determine nitrogen excretion ($N_{ex}$) did not fully coincide with the data from GUS. In response to a question raised by the ERT during the review, Poland explained that the animal categories used by the Institute of Soil Sciences (IUNG) to derive the $N_{ex}$ rates of swine are not consistent with the census of the National Statistics Division. Consequently, an approximate and conservative approach was used to establish a weighted mean $N_{ex}$ factor of 13.56 kg/head/year. The Party provided additional background data that demonstrate that the value used in the Polish inventory is accurate and comparable to values from other reporting Parties included in Annex I to the Convention. Furthermore, Poland stated that it will include additional information on the $N_{ex}$ rate of swine in the NIR of its next annual submission. The ERT reiterates the recommendation made in the previous review report that Poland include the additional information provided to the ERT during the 2013 and 2014 annual reviews in the NIR of its next annual submission.

Direct soil emissions – $N_2O$

73. Poland has reported data on emissions from crop production in NIR table 6.14 and CRF table 4.F. The ERT noted that the information provided is not in all cases consistent. Some crop subcategories are defined and grouped differently (e.g. vegetables, fruits, rape and agrimony) and the crop production data are, hence, different on an aggregated level. In response to a question raised by the ERT during the review, Poland explained that the emission calculation is based on the same background data and is conducted in the same file for every crop separately. Furthermore, Poland stated that the apparent discrepancies are only due to the different level of aggregation used for the crop species and that it will harmonize the information provided. The ERT recommends that Poland consistently report crop production across all emission categories and between the CRF tables and the NIR.

74. In the NIR (page 172), Poland states that as the consistent reporting of data concerning the application of sewage sludge in agriculture starts in 2003, the activities since 1988 were supplemented based on annual mean changes in AD in the period 2003–2012 (figure 6.7 of the NIR). In response to a question raised by the ERT during the review, Poland explained that a trend interpolation was conducted based on the number of people using sewage treatment plants (AD from the waste sector). The ERT considers that this is in accordance with the IPCC good practice guidance and recommends that Poland include this explanation in the NIR.

Indirect emissions – $N_2O$

75. In the NIR (page 169), Poland states that the $Frac_{GASM}$ (fraction of livestock nitrogen excretion that volatilizes as ammonia ($NH_3$) and nitrogen oxides ($NO_x$)) value used is the default value from the Revised 1996 IPCC Guidelines (table 4-19) and equals 0.2 kg $NH_3$-N+$NO_x$-N/kg of nitrogen excreted by livestock. However, in the reference list (NIR,

page 274), as well as in Poland's *Informative Inventory Report 2014*[8] (submission under the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution), the publication by Pietrzak (2006)[9] is mentioned. The ERT therefore considers that additional detailed and country-specific information on the volatilization of $NH_3$ is available in Poland. In response to a question raised by the ERT during the review, Poland explained that there are plans to further harmonize the total nitrogen balance/emissions reported under the UNFCCC and UNECE. The ERT welcomes this planned improvement and encourages Poland to proceed with the streamlining and harmonization of the submissions under different international bodies.

### 3. Non-key categories

Field burning of agricultural residues – $N_2O$

76. In the previous review report, the ERT considered that the approach used by Poland to estimate the amount of agricultural residues burned was not accurate and led to an overestimation of emissions. In response to a question raised by the ERT during the 2014 review, Poland provided information explaining that the estimates are mostly based on expert judgement. The potential for burning of agricultural residues has been assessed in an expert case study (Loboda, 1994)[10] and was updated by IUNG (2012)[11] in the course of annual verification procedures. The ERT strongly reiterates the recommendation made in the previous review report that Poland include more information about the assumptions used to estimate emissions from this category in its NIR.

## E. Land use, land-use change and forestry

### 1. Sector overview

77. In 2012, net removals from the LULUCF sector amounted to 31,854.64 Gg $CO_2$ eq. Since 1988, net removals have increased by 145.1 per cent. The key drivers for the rise in removals are associated with the increase in the average growing stock per unit area (from 157.5 $m^3$/ha in 1988 to 262.4 $m^3$/ha in 2012, a 69.0 per cent increase), the increase in the forest land area since 1988 (from 8,667.00 ha in 1988 to 9,353.73 ha in 2012, a 7.9 per cent increase) and the increased share of high-activity soils in forest land. Within the sector, 39,211.89 Gg $CO_2$ eq of net removals were from forest land. Net emissions were reported from wetlands (5,347.76 Gg $CO_2$ eq), cropland (1,516.65 Gg $CO_2$ eq), grassland (379.51 Gg $CO_2$ eq) and settlements (113.34 Gg $CO_2$ eq). Net emissions/removals from other land were reported as "NO, NA".

78. Poland has made recalculations between the 2013 and 2014 annual submissions for this sector. The three most significant recalculations made by Poland between the 2013 and 2014 annual submissions were in the following categories: forest land, cropland and grassland. The recalculations were made for the entire inventory period (1988–2012) following changes in the methodology used to estimate the changes in carbon stock in the living biomass in forest land, from the default (gain-loss) method to the stock-change method; due to the revision of biomass increments on land converted to forest land; due to

[8] Available at <http://www.kobize.pl/materialy/Inwentaryzacje_krajowe/2014/IIR_Poland_2014.pdf>.
[9] Pietrzak S. 2006. *Methodology of Ammonia Emissions Inventory from Agricultural Sources in Poland and its Practical Application* (in Polish). Water environment, rural areas. Document T. 6 z 1 (16) s. 319-334. Instytut Melioracji i Użytków Zielonych w Falentach.
[10] Loboda T. and Pietkiewicz S. 1994. *Estimation of Amount of $CH_4$, CO, $N_2O$ and $NO_x$ Released to Atmosphere from Agricultural Residues Burning in 1992* (in Polish). Warsaw Agricultural University.
[11] IUNG. 2012. *Factors Describing Residue to Crop Ratio for Crops. Information from the Ministry of Agriculture and Rural Development*. Document RR.te.st-75/21/2012 (1345).

the revision of soil classification; and following the introduction of new country-specific soil organic carbon stocks estimates. Compared with the 2013 annual submission, the recalculations increased removals in the LULUCF sector by 13,705.19 Gg $CO_2$ eq (62.5 per cent) for 2011. The recalculations were not adequately explained since the NIR does not indicate the impacts of the new methods, AD or EFs on the changes in carbon stock in each subcategory, but provides only summary information on the recalculations at the category level. In response to questions raised by the ERT during the review, the Party explained that the changes in methods, AD and EFs were applied in accordance with the availability of the new data sources. The ERT reiterates the recommendation made in the previous review report that Poland provide detailed information on the rationale and impact of the recalculations in the next annual submission.

79. Poland reported most mandatory emissions and removals from the LULUCF sector. However, the Party has reported the carbon stock changes in the following subcategories as "NO": the organic soil pool for grassland converted to cropland, cropland converted to grassland (except for the soil pool), and wetlands converted to settlements. The ERT recommends that Poland estimate and report the carbon stock changes from all mandatory categories in the next annual submission to improve the completeness of the reporting.

80. The ERT notes that the Party has improved the transparency of the reporting of land representation in the NIR by providing the land-use matrix for 2012 in annex 6 to the NIR. For the identification of land-use categories for the reporting under the Convention (and its Kyoto Protocol), Poland used the national land-use classification and further categorized it into the six land-use categories defined in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The areas of land-use representation and land-use change are identified at the level of a single cadastral unit reported in the annually updated statistical data published by GUS, which are obtained from the results of the land-use and sown area survey and the national registry of the intended use of land according to the Regulation on the Registry of Land and Buildings (approach 2 for land representation from the IPCC good practice guidance for LULUCF). However, the data presented in annex 6 to the NIR do not provide the land-use transitions from one category to another but only the annual totals under each category and subcategory (approach 1). Furthermore, the ERT noted that the total territorial area in annex 6 is only consistent for the period 2009–2012. For the other years since 1988, the total area shows annual variability from 31,267,938 ha to 31,268,800 ha, even with the inclusion of other land. In response to questions raised by the ERT during the review, the Party provided the land-use transition matrix (approach 2) for the entire time series (1988–2012) and the underlying statistical information.[12] The Party explained that the recent examination of land-use changes, as provided in the land-use transition matrix, resulted in some inconsistencies in relation to the data already reported. The Party also explained that it is planning to provide the relevant land-use and land-use change data and corresponding estimates in the next annual submission, subject to the required QA/QC procedures. The ERT reiterates the recommendation made in the previous review report that Poland include the land-use transition matrices (approach 2) in its NIR and revise the time series of the land-use change data to ensure that the total territorial area is consistent for the entire inventory period since 1988 in the next annual submission.

81. The previous review report identified discrepancies in the total land area between the values reported in the CRF tables and those reported to FAO, which are still present in

[12] Forest Management and Geodesy Bureau of Poland. 2012. *Annual Update of Forest Area and Timber Resources in State Forests in Poland at 1 January 2012*. Available at <http://www.lasy.gov.pl/publikacje/copy_of_gospodarka-lesna/urzadzanie/aktualizacja-stanu-powierzchni-lesnej-i-zasobow-drzewnych-w-lp>.

the 2014 annual submission. During the previous review, Poland explained that the discrepancy in the total forest land area was due to the different allocation of three country-specific land-use categories (land under waters, agricultural land under ponds and agricultural land under ditches) between the FAO reports and the CRF tables. Poland also explained that the forest land areas differ because the forest areas reported to FAO were developed on the basis of information obtained from stand-alone statistical surveys in the forestry sector. In response to questions raised by the ERT during the 2014 review, Poland explained that the relevant information will be provided in the next annual submission. The ERT reiterates the recommendation made in the previous review report that Poland include the information on the data discrepancy with the FAO data in the NIR of its next annual submission.

82. Uncertainties have been reported for each individual broad land-use category and for $CO_2$, $CH_4$ and $N_2O$ using the tier 1 approach provided in the IPCC good practice guidance. For 2012, the uncertainty assumptions were applied to the AD and EFs, instead of the emissions as in previous years. However, the data sources used for the uncertainty assumptions are not mentioned in the NIR. The ERT recommends that Poland provide the data sources used for the uncertainty assumptions of the AD and EFs for each category or carbon pool in the NIR, to improve the transparency of the uncertainty reporting.

83. In CRF table 5.C, Poland reports the net carbon stock changes in organic soils for cropland converted to grassland as "IE". Poland explained in the CRF table that the relevant emissions are allocated to the category grassland converted to cropland. However, in CRF table 5.B, Poland reports the net carbon stock changes in organic soils for grassland converted to cropland as "NO". The ERT recommends that Poland provide estimates for those mandatory reporting subcategories following the IPCC good practice guidance for LULUCF or clearly indicate the subcategory to which these emissions/removals have been allocated.

84. The ERT noted that Poland continues to use the notation key "IE" to report the net carbon stock changes in all carbon pools in the category cropland converted to settlements in CRF table 5.E, without clarifying the allocation of these emissions and removals. The Party has used the notation key "IE" to report the $CO_2$ emissions in grassland from agricultural lime application in CRF table 5(IV). The ERT reiterates the recommendation made in the previous review report that Poland clearly explain the allocation of these emissions and removals and encourages the Party to estimate the carbon stock changes in the remaining pools in cropland converted to settlements, if not included elsewhere, or to change the notation key to "NE".

85. Poland has used the notation key "NA" to report the information items in CRF table 5 (forest land converted to other land uses; and grassland converted to other land uses). Since values for these land conversions have been provided in CRF tables 5.A–5.F, the ERT encourages Poland to report the aggregated estimates accordingly.

86. Poland has reported the land-use conversion to forest land and grassland from cropland; these conversions have been a sink for the entire time series. The Party has reported the carbon losses in living biomass as "NO". However, according to the IPCC methodology for land conversion, the loss of carbon stock present in the land prior to conversion should be reported. Not reporting these losses can lead to an underestimation of the changes in carbon stock and, hence, the associated net emissions. In response to a question raised by the ERT during the review, Poland explained that it reports the losses in living biomass from cropland converted to forest land and grassland using the notation key "NO", considering that the potential loss of carbon stock from cropland is only from perennial woody crops (orchards), which are located in very valuable and productive agricultural soils. Therefore, the Party applied the assumption that the potential conversion of orchards to forest land and grassland does not occur, in order not to lose the productivity

of that valuable land. The ERT recommends that Poland provide evidence that orchards have not been converted to forest land in the next annual submission.

## 2. Key categories

Forest land remaining forest land – $CO_2$

87. As mentioned in the NIR (paragraph 7.2.4.3), Poland shifted from the gain-loss method to the carbon stock-difference method to estimate the carbon stock changes in living biomass in the 2014 annual submission. Poland has reported annual data on the gross timber resources for the inventory years 1988–2012 in its NIR (page 186) and calculated the annual average growing stock volume of merchantable timber per ha. The Party has estimated the carbon stock changes in above-ground biomass for forest land remaining forest land based on the difference in the annual average growing stock volume per ha compared to the previous year. There is a significant increase of 17 per cent in the gross timber resources between 2008 and 2009 compared to the previous years. However, there is no significant increase in the carbon stock in living biomass between 2008 and 2009 in forest land. The ERT considers that this is not in accordance with equation 3.2.3 of the IPCC good practice guidance for LULUCF because if the Party uses the stock-difference method, the increase/decrease of the carbon stock in living biomass should be consistent with the increase/decrease of the gross timber resources. In response to a question raised by the ERT during the review regarding this inconsistency, Poland explained that important changes related to the volume stock of merchantable timber as well as the average volume between 2008 and 2009 are a consequence of the introduction of the national forest inventory (NFI) system in 2005, with the earliest NFI results available since 2009. To ensure that the data remain consistent, Poland estimated the carbon stock changes in above-ground biomass for 2009 by using the mean of the difference in the annual average growing stock volume per ha compared to the previous year between 2008 (2007–2008) and 2010 (2009–2010) by interpolation. The ERT recommends that Poland provide more detailed information on how the NFI data were factored into the calculation to estimate the growing stock volume since 2009. In addition, the ERT recommends that Poland seek to resolve the issue regarding the time-series consistency between 2008 and 2009 for the gross timber resources using the IPCC approaches.[13]

88. Poland has used data on the merchantable volume, basic wood density and biomass expansion factor (BEF) to convert the merchantable volume to above-ground tree biomass, root-to-shoot ratio and carbon fraction of dry matter to estimate the annual changes in carbon stock in living biomass. Poland has adequately used the methodology provided in the IPCC good practice guidance for LULUCF and used the default values provided for the BEF and the root-to-shoot ratio. These default values have been used to calculate an average BEF and root-to-shoot ratio weighted by species (coniferous and deciduous). Since Poland has a robust forest inventory in place, with data discriminated by species, age and ownership, the ERT recommends that Poland explore the possibility of using country-specific parameters according to the age and species, instead of a weighted average, and indicate clearly in the next annual submission the results of such attempt and the limitations encountered.

89. For the years 1988–2007, Poland has reported the changes in carbon stock from dead organic matter (DOM) in forest land remaining forest land using the notation key "NO", due to the use of a tier 1 method from the IPCC good practice guidance for LULUCF that assumes that the dead wood and litter carbon stocks are stable and that the

[13] See section 5.6 "Time series consistency and recalculations" from the IPCC good practice guidance for LULUCF.

inputs and outputs are balanced and the pool is therefore assumed to remain stable. However, from 2008 onwards Poland has reported the changes in carbon stock from DOM, including litter and dead wood. Although Poland indicates that there are no data available to report the changes in carbon stock for DOM for the years prior to 2008, the ERT recommends that Poland ensure the time-series consistency of the reported estimates for both litter and dead wood using the appropriate IPCC approaches.[14]

90. The changes in carbon stock in mineral soils have been calculated taking into account the impact on mineral soil organic carbon of different forest types (forest habitats) in the last 20 years (default transition period defined by the IPCC). Poland uses a tier 2 method, assuming that all adjustment factors in equation 3.2.14 from the IPCC good practice guidance for LULUCF are equal to 1 (forest types, management practices or disturbance regimes), and default reference soil carbon stocks from the IPCC good practice guidance for LULUCF (table 3.2.4) for cold temperate, dry regions. The ERT notes that this is not consistent with the category cropland remaining cropland for which Poland used the management factor of 1.09 (for temperate wet climates). The ERT recommends that Poland use consistent regions when selecting the default values among the categories or derive a country-specific adjustment factor reflecting the effect of the change from the previous forest type to the new one using, as an interim measure, the results from the available literature.

91. The carbon stocks in mineral soils at a 1 m layer under deciduous forests range from 65 to 115 Mg C ha-1, while deciduous forests with high-activity clay are within the range of 140 to 250 Mg C ha-1. These values are derived from a country-specific study[15] and are still being analysed and tested. From 1992 to 2012, there was a decrease in forest types on high-activity soils by 12.2 per cent, whereas forest types on sandy soils, characterized by coniferous forests, increased by 11.5 per cent. Low-activity soils increased by 1.3 per cent, while wetlands soils decreased by 0.6 per cent. The ERT encourages Poland to disaggregate the mineral soil by type in the CRF tables to provide a clearer understanding of the soil transitions (e.g. from high to low activity; and from low activity to sandy) in order to improve the transparency of the reporting.

Land converted to forest land – $CO_2$

92. To estimate the changes in carbon stock in living biomass from land converted to forest land, Poland applied the gain-loss method using the default value (tier 1) provided in the IPCC good practice guidance for LULUCF (equation 3.2.23). However, in the NIR (table 7.2.8), Poland refers to the incorrect unit in the default value applied from the IPCC good practice guidance for LULUCF (table 3A.1.5) which should be t dry matter/ha/year instead of $m^3$/ha/year. In response to a question raised by the ERT during the review, Poland explained that the incorrect application of the default biomass increment value into equation 3.2.23 had caused a significant underestimation of the potential removals for the categories under land converted to forest land. The ERT recommends that Poland revise the default biomass increment value for this category.

93. The previous ERT recommended that Poland should not use the mean value of all age classes but should instead use the data exclusively for age class I (1–20 years) from the NFI (tier 2) in order to estimate the carbon stock changes in above-ground biomass for land converted to forest land. However, Poland has used the default value of the average annual increment in above-ground biomass (tier 1) for both conifers and broadleaf for the age class less than or equal to 20 years or above 20 years from the IPCC good practice guidance for

[14] As footnote 13 above.

[15] Poznan et al. 2011. *The Balance of Carbon in the Biomass of the Main Forest-forming Species in Poland*.

LULUCF (table 3A.1.5). In response to a question raised by the ERT during the review, Poland explained that data for the growing stock distribution in age class I (1–20 years) and its annual changes obtained from the NFI would be highly influenced by the growing stock changes on forest land with felling site renewals. As this might lead to additional uncertainty or the overestimation of removals, the Party has used the default value from the IPCC good practice guidance for LULUCF. In order to improve accuracy, the ERT reiterates the recommendation made in the previous review report that Poland further analyse the NFI data and use data exclusively from age class I (1–20 years old) for the estimation of the carbon stock changes in living biomass and dead wood for land converted to forest land in the next annual submission.

94. Poland does not disaggregate the area of land converted to forest land by species, providing only the total area converted. Regarding the loss component of the equation, Poland reports the loss due to harvest of industrial wood and saw logs, fuel wood gathering, fires and other disturbances using the notation key "NO". The ERT recommends that Poland apply the tier 2 gain-loss method, which follows a more disaggregated approach and allows for more precise estimates of the changes in carbon stocks in biomass. This method also considers the changes in biomass due to actual conversions by estimating the difference between the initial biomass stocks on non-forest land before and after conversion to forest land. The ERT also recommends that Poland disaggregate the area converted by species and clarify in the NIR of the next annual submission why the conversion occurs only for extensively managed forests and not intensively managed forests, as would be the case for plantations.

95. Poland provides in its NIR very limited information regarding the estimation of the changes in carbon stock for land converted to forest land. The Party has reported the carbon stock changes in dead organic matter in the CRF tables as "NO", without any justification in the NIR. In addition, although Poland has reported the carbon stock changes in mineral and organic soils, no background data or information are referred to in the NIR. The ERT strongly recommends that Poland provide more detailed information on the estimation methods used for the carbon stock changes in the dead organic matter and soil pools in the NIR of its next annual submission for this land-use subcategory.

Cropland remaining cropland – $CO_2$

96. To estimate the changes in carbon stock in mineral soils for cropland remaining cropland, the ERT noted that Poland linearly interpolated and extrapolated the area of cropland under different soil types using the available data for 1985, 1990 and 2000 in its NIR (page 197). The ERT recommends that the Party provide the interpolated and extrapolated results in the NIR of the next annual submission. In addition, the ERT notes that Poland used the management factor of 1.09 (for temperate wet climates), while it should have used the value of 1.03 (for temperate dry climates). In response to a question raised by the ERT during the review, Poland explained that the default EFs for temperate wet climates were considered to be the most appropriate to the national circumstances, taking into account the relatively high precipitation during the mild summers with frequent showers and thundershowers. The average annual air temperature is around 6–8.5 °C. The annual average precipitation is about 610 mm, with the annual rainfall around 500–700 mm, of which snow constitutes only 5–20 per cent. The ERT recommends that Poland include this information in the next annual submission.

Wetlands – $CO_2$

97. Poland reports emissions from wetlands remaining wetlands, although it is not a mandatory reporting element. The Party has included a table in the NIR (table 7.32) with the area of organic soils managed for peat extraction in the period 1999–2011, disaggregated by soil fertility (nutrient-rich and nutrient-poor); however, the data presented

in the table do not correspond to those reported in CRF table 5.D and are not disaggregated by soil fertility, thereby making it difficult to assess the accuracy of the emission estimates provided. The emissions reported in this subcategory are associated only with losses from living biomass without sufficient background information on the estimation method. The ERT notes that the methodological approach provided in the IPCC good practice guidance for LULUCF refers to changes in carbon stocks in soils due to the drainage of organic soils converted to peat extraction. The ERT encourages Poland to provide the actual area of organic soils managed for peat extraction in CRF table 5.D, disaggregated by soil fertility, and also to provide the estimates of the changes in carbon stock in soils and information on how the emissions from living biomass have been estimated. The ERT notes that this subcategory has been identified as a key category in both the trend and level analyses.

### 3. Non-key categories

Land converted to cropland – $CO_2$

98. Poland has reported that 28.86 kha of grassland were converted to cropland only in 2003. Poland reports, for 2003, the gains in carbon stock in living biomass but not the losses from the conversion which are reported in 2004. Poland reported the changes in carbon stock in living biomass as "NO" for the years 2005–2012. The ERT recommends that Poland explain, in the next annual submission, why the gain in carbon stock in living biomass occurred only in 2003 and clarify why the loss of living biomass occurred in 2004 (one year after the conversion). In addition, Poland has not reported the net carbon stock changes in organic soils for grassland converted to cropland, although AD were provided. In response to a question raised by the ERT during the review, Poland explained that the carbon stock changes in organic soils will be reported in the next annual submission.

Grassland remaining grassland – $CO_2$

99. Poland uses a tier 1 approach to report the changes in carbon stock in living biomass for grassland remaining grassland, hence assuming no change, and reports the changes using the notation key "NO". The changes in carbon stock in mineral and organic soils are reported as net sources, but Poland does not include in the NIR any explanation regarding how the estimates have been derived. The ERT recommends that Poland provide details regarding the calculation of changes in carbon stock in soils to increase the transparency of the reporting.

Land converted to grassland – $CO_2$

100. To estimate the changes in carbon stock in mineral and organic soils, the ERT noted that Poland linearly extrapolated the area of grassland under different soil types using the latest available data from 2000. The ERT recommends that Poland include information on the extrapolated results in the NIR of the next annual submission. In addition, the ERT notes that Poland used the relative stock change factors from table 3.3.4. (on cropland) of the IPCC good practice guidance for LULUCF for this subcategory, instead of the values for grassland. The ERT recommends that Poland use the relative stock change factors from table 3.4.5. (on grassland) of the IPCC good practice guidance for LULUCF for this subcategory in the next annual submission.

Biomass burning – $CO_2$, $CH_4$ and $N_2O$

101. In CRF Table 5(V), Poland reports $CO_2$ emissions from wildfires in forest land remaining forest land, in addition to $CH_4$ and $N_2O$. The ERT notes, however, that since Poland uses the stock-difference method to estimate the changes in carbon stock in living biomass, the method captures the changes in biomass due to growth, harvest and disturbance and, hence, reporting the $CO_2$ emissions due to fires would imply double counting. In addition, the ERT notes that Poland did not include in the NIR transparent

information regarding the values used as input to equation 3.2.20 (e.g. mass of available fuel, fraction of biomass combusted, EF) to estimate the non-$CO_2$ emissions from wildfires. In response to questions raised by the ERT during the review, Poland explained that the impact of the wildfires on living biomass might not be clearly reported in the statistics of growing stocks based on the NFI. Therefore, in order not to omit any potential emission sources, the Party has estimated $CO_2$ emissions from wildfires in CRF table 5(V). The ERT recommends that Poland provide more information on the values used as input to equation 3.2.20 in the next annual submission to improve the transparency of its reporting.

## F. Waste

### 1. Sector overview

102. In 2012, emissions from the waste sector amounted to 15,238.55 Gg $CO_2$ eq, or 3.8 per cent of total GHG emissions. Since 1988, emissions have increased by 19.4 per cent. The key driver for the rise in emissions is the increase in the amount of domestic wastewater treated anaerobically. Within the sector, 56.2 per cent of the emissions were from solid waste disposal on land, followed by 41.9 per cent from wastewater handling and 1.9 per cent from waste incineration.

103. Poland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Poland between the 2013 and 2014 annual submissions were in the following categories: solid waste disposal on land and wastewater handling. The recalculations were made following changes in: AD for industrial waste disposed on solid waste disposal sites; the calculation method and AD for the amount of methane recovered; and the estimation of emissions from biological treatment of solid waste. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector by 772.76 Gg $CO_2$ eq (5.4 per cent) and increased total national emissions for 2011 by 0.2 per cent. The recalculations were adequately explained in the NIR and in CRF table 8(b).

104. The ERT noted that most of the recommendations made in the previous review report for the waste sector were implemented in the 2014 annual submission (see paras. 106, 107 and 110 below).

### 2. Key categories

Solid waste disposal on land – $CH_4$

105. The IPCC first-order decay method was used to estimate $CH_4$ emissions from solid waste disposal on land and the default EFs and parameters from the 2006 IPCC Guidelines were used to estimate $CH_4$ emissions from solid waste disposal on land. In response to a question raised by the ERT during the review, Poland explained that the method provided in the 2006 IPCC Guidelines is well suited to the AD available in the country.

106. Following a recommendation made in the previous review report,[16] Poland has included information that imported solid waste is mostly hazardous waste for incineration (no municipal waste is imported) and the amount is included in the data on incinerated waste used by the Party for the estimates of waste incineration. The ERT commends Poland for providing these estimates and improving the completeness and transparency of its inventory.

107. Following a recommendation made in the previous review report,[17] Poland has estimated the degradable organic carbon (DOC) value for solid waste disposal on land for

[16] FCCC/ARR/2013/POL, paragraph 117.
[17] FCCC/ARR/2013/POL, paragraph 115.

managed and deep, unmanaged sites based on equation 5.4 from the IPCC good practice guidance. The estimated DOC value is provided in CRF table 6.A. However, information on the method used to estimate the DOC value is not presented in the NIR. The ERT recommends that Poland include this information in the NIR.

108. In CRF table summary 3, Poland explains that a tier 3 method was applied for the calculation of $CH_4$ emissions from this category. However, the NIR indicates that Poland uses a tier 2 method from the 2006 IPCC Guidelines. In response to a question raised by the ERT during the review, Poland explained that incorrect information had been reported in the CRF tables. The ERT recommends that Poland correct this information in the CRF tables and improve its QA/QC procedures.

109. Poland has reported emissions from biological treatment of solid waste for the first time in the 2014 inventory submission. The emissions were reported under other (solid waste disposal) as compost. The calculations are based on the tier 1 method from the 2006 IPCC Guidelines. Data on the amount of waste treated biologically for the years 1993–1997 and 1998–2012 were obtained from GUS and data for 1997 were interpolated. For the years 1988–1992, the AD were obtained by extrapolation. The ERT commends Poland for providing these estimates and improving the completeness of its inventory.

Wastewater handling – $CH_4$ and $N_2O$

110. Following a recommendation made in the previous review report that the Party assess the $CH_4$ recovered and revise the figures for $CH_4$ recovery from sludge, Poland has recalculated the $CH_4$ recovery by changing the source of $CH_4$ recovery data from calculated values based on expert judgement to data from GUS[18] (data on recovered methane for energy combustion). As a result, the trend of emissions changed from decreasing to increasing, and the wastewater handling category became a key category. The ERT commends the Party for the improvement in the reporting of $CH_4$ recovery. However, the information presented in the NIR is not sufficiently transparent and the ERT recommends that Poland improve the transparency by reporting the practices related to $CH_4$ recovery in the next annual submission.

111. The ERT noted that the $CH_4$ emissions from domestic and commercial wastewater (sludge) are the highest among all reporting Parties and that the emissions from this category are probably overestimated. In response to a question raised by the ERT during the review, Poland explained that it is currently making efforts to improve the estimates by using a new methodology from the 2006 IPCC Guidelines. The ERT commends Poland for its planned improvement and recommends that the Party report revised emission estimates in the next annual submission.

112. The $N_2O$ emissions from human sewage were calculated according to the default IPCC method. Data on the population were obtained from GUS and the value of protein consumption/capita/year was obtained from the FAO database. For the period 2010–2012, protein consumption was assumed to be at the same level as the 2009 data due to a lack of data in the FAO database for 2009 onwards. The ERT agrees with this estimation. Given that the new FAO database is available from 16 September 2014, the ERT recommends that Poland use the latest available data in its next inventory submission.

[18] <http://old.stat.gov.pl/cps/rde/xber/gus/ee_energy_from_renewable_sources_in_2012.pdf>.

## G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

### 1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

113. Table 6 provides an overview of the information reported and parameters selected by Poland under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
**Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

| *Issue* | *Expert review team assessment, if applicable* | *Findings and recommendations* |
|---|---|---|
| Assessment of Poland's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1 | Sufficient | 115 |
| Activities elected under Article 3, paragraph 4, of the Kyoto Protocol | Activities elected: forest management<br>Years reported: 2008, 2009, 2010, 2011, 2012 | 125 |
| Period of accounting | | Commitment period accounting |
| Poland's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1 | Sufficient | |

114. Chapter G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 115–127 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

115. The ERT notes the improvement compared to the 2013 inventory in terms of the information reported in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1 and concluded that sufficient information has been provided by Poland, following the recommendations of the previous ERT (see paras. 122 and 125 below) and taking note of the supplementary information provided during the review.

116. As also pointed out in the 2013 review report, Poland has not included transparent information in its NIR in order to verify the consistency and justify the difference between the areas of land-use categories (land converted to forest land, forest land converted to other land uses and forest land remaining forest land) and the KP-LULUCF activities (afforestation and reforestation, and deforestation, and forest management). In response to questions raised by the ERT during the review, the Party provided the land-use transition matrix for the entire inventory period (1988–2012), allowing the ERT to verify the

consistency and the difference between the areas of land-use categories under the Convention and the KP-LULUCF activities (see para. 80 above).

117. Poland has made recalculations between the 2013 and 2014 annual submissions for the KP-LULUCF activities, which resulted in a decrease in removals from afforestation and reforestation (A/R) of 57.3 per cent, an increase in net emissions from deforestation of 50.0 per cent and an increase in removals from forest management of 60.0 per cent for 2011. The recalculations were made following the revision of the biomass increment for land subject to A/R; the introduction of data from the most recent five-year cycle of the large-scale NFI; the inclusion of litter loss for deforestation; and the shift of the estimation method for the carbon stock changes in living biomass from the default (gain-loss) method to the stock-difference method for forest management using data from the latest NFI. The ERT considered the more extensive information provided in the latest NFI and concluded that the above-mentioned changes have not resulted in an overestimation of removals in the first commitment period.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

*Afforestation and reforestation – $CO_2$*

118. Poland has used the notation key "NO" in CRF table 5(KP-I)A.1.2 to report the units of land harvested since the beginning of the commitment period for A/R, without justification in its NIR. In response to questions raised by the ERT during the review, Poland explained that it made efforts to investigate this issue and concluded that there are no areas of A/R which have been subject to harvest since the beginning of the commitment period. This is supported by the fact that the normal harvesting cycles for the main tree species in Poland are more than 40 years, which is determined and approved based on the forest management plan considering the site and stand conditions, as well as the forest management objectives.

119. In CRF table 5(KP) for A/R, Poland has used the notation keys "IE" and "NO" to report the net $CO_2$ emissions/removals, and $CH_4$ and $N_2O$ emissions for the units of land harvested since the beginning of the commitment period. However, the Party reported only the notation key "NO" in CRF table 5(KP-I)A.1.2. In response to a question raised by the ERT during the review, Poland explained that the notation key "IE" for this activity is related to the potential emissions assigned to forest fires on those areas. Due to the high level of data aggregation related to forest fires, the Party was not able to disaggregate the emissions from forest fires assigned to this source at the level as provided in the CRF tables and all the emissions related to forest fires on A/R land are accounted for at aggregated level in CRF table 5(KP-II)5.

120. As noted in chapter II.E above on the LULUCF sector, Poland has used the incorrect unit in the default value for the average annual increment in above-ground biomass for A/R, which should be t dry matter/ha/year instead of $m^3$/ha/year. This led to an underestimation of removals (see para. 92 above). In addition, although A/R is a key category, Poland has used the gain-loss method with the default value of the average annual increment in above-ground biomass (tier 1) for both conifers and broadleaf for the age class less than or equal to 20 years or above 20 years from the IPCC good practice guidance for LULUCF (table 3A.1.5) (see para. 93 above). The ERT concluded that the above-mentioned issues have not resulted in an overestimation of removals from A/R in the first commitment period.

121. Further, the ERT noted some transparency issues that were discussed during the review. Poland has used the notation key "NO" to report the carbon stock changes in dead organic matter in CRF table 5(KP-I)A.1.1 for A/R, providing verifiable information in the NIR (section 11.3.1.2) to demonstrate that these pools are not net sources because there is no dead wood and litter before conversion, combined with post-A/R accumulation of carbon stock in those pools. However, the ERT noted that the information provided is not

sufficient. In response to a question raised by the ERT during the review, Poland further explained that the potential carbon stock loss in dead organic matter from the previous land use can only result from perennial woody crops (orchards). Since orchards are located in very valuable and productive agricultural soils, the Party applied the assumption that the potential conversion of orchards to forest land does not occur, in order not to lose the productivity of that valuable land. The ERT accepted this explanation, demonstrating that the category is not a net source (see para. 86 above). Although Poland has reported the carbon stock changes in mineral and organic soils for A/R, the NIR provides insufficient background data and information on the estimates, as discussed in chapter II.E above on the LULUCF sector (see para. 95 above). The ERT assessed that the carbon stock changes in mineral soils for A/R were estimated taking into account the default reference soil organic carbon stocks before and after the conversion considering the soil types with the transition period in the last 20 years defined by the IPCC. On the other hand, the carbon stock changes in organic soils for A/R were estimated using the same method as for forest land remaining forest land. Based on the information provided during the review, the ERT concluded that the above-mentioned issues have not resulted in an underestimation of emissions or an overestimation of removals in the first commitment period. However, the ERT recommends that the Party provide more detailed information in the NIR on the methodologies and assumptions applied for each pool.

*Deforestation – $CO_2$*

122. Poland has improved the completeness of the reporting by estimating the carbon stock changes in litter for deforestation following the recommendation made in the previous review report. The ERT commends Poland for the improvement.

123. Poland has provided a definition of deforestation in its NIR (page 253) as "any exclusion of forest land for non-forestry and non-agricultural purposes". The ERT noted that land-use change from forest land to agricultural purposes should be categorized as deforestation. In response to a question raised by the ERT during the review, Poland clarified that forest land is not allowed to convert to other land-use categories except for settlements owing to national regulations. Therefore, conversion of forest land to agricultural purposes in Poland is not occurring. In addition, Poland explained that it is planning to revise the definition of deforestation as "any exclusion of forest land for non-forestry purposes". The ERT concluded that the above-mentioned issues have not resulted in an underestimation of emissions or an overestimation of removals in the first commitment period.

124. Poland calculated the average growing stock per ha per year based on the total forest area and total growing stock from GUS and used it to define the country-specific EFs for the estimation of emissions from deforestation. In response to a question raised by the ERT during the review, Poland explained that due to the high level of data aggregation and relatively small areas of deforestation, it is not possible to provide the age class and the species composition (deciduous and broadleaf) of the area deforested. In addition, the average growing stock per ha calculated for the year 2008 (217.18 $m^3$/ha) represents a significant difference compared with the data calculated for the following years 2009–2012 (253.50–262.44 $m^3$/ha) which were obtained from the latest NFI data. In order to avoid the underestimation of emissions from deforestation, the Party has used the data exclusively from the State forests to obtain the average growing stock per ha for the year 2008 (245.00 $m^3$/ha) which is greater than the average growing stock per ha calculated using the total forest area and total growing stock. The ERT assessed the information and concluded that the above-mentioned issues have not resulted in an underestimation of emissions from deforestation in the first commitment period.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

*Forest management – $CO_2$*

125. Previous ERTs recommended that Poland provide verifiable information demonstrating that the litter pool for forest management is not a net source or estimate and report the carbon stock changes in the litter pool. In response to a recommendation made by previous ERTs, Poland has reported the carbon stock changes in the litter pool in CRF table 5(KP-I)B.1 for forest management using the default values for litter provided in the IPCC good practice guidance for LULUCF (table 3.2.1, page 3.36; cold, temperate, dry climates) and a transition period of 20 years. The ERT notes, however, that the use of these default values is applicable when the forest land is transitioning from one state to another (for instance, due to a change in management intensity or practices, or a change in disturbance regime, or changes in forest types) (see page 3.35 of the IPCC good practice guidance for LULUCF, tier 1 default method). Otherwise, in a mature forest classified as forest land remaining forest land, where the intensity, practices, disturbance regime and forest types have not been subject to significant changes, the change in carbon stock in the litter pool is expected to be in balance. In response to a question raised by the ERT during the review, Poland responded that its "forests are not experiencing significant changes in forest types or disturbance or management regime; and that the changes occur mainly due to long-term management practices aiming at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner". Therefore, the ERT concluded that the use of the default data provided in table 3.2.1 of the IPCC good practice guidance for LULUCF could lead to an overestimation of removals for the litter pool under forest management. This issue was included in the list of potential problems and further questions raised by the ERT. The ERT recommended that the Party either: provide information justifying the use of the IPCC defaults, taking into consideration the characteristics of the forest, and showing that significant changes in management practices, disturbance regimes and forest species exist and would impact the litter pool, thereby justifying the use of the IPCC defaults; or provide revised estimates and KP-LULUCF CRF tables, assuming that the annual litter inputs and outputs are balanced, and therefore stable, and apply the tier 1 method provided on page 3.35 of the IPCC good practice guidance for LULUCF, reporting the carbon stock changes from litter as zero.

126. Poland submitted revised estimates in response to the list of potential and further questions raised by the ERT following the recommendation of the ERT and reported the removals from litter as "NO". The resubmission was also based on expert judgement supported by a combination of qualitative and quantitative arguments, such as international references to neighbouring countries' GHG inventories and conservative assumptions based on in-country forestry practices. As a result of the resubmission, the net removals decreased by 193.70 Gg $CO_2$ eq. amounting to a 0.1 per cent decrease in the total removals from forest management activities in the first commitment period. The ERT considered the potential overestimation of the removals to be resolved.

127. As indicated in chapter II.E above on the LULUCF sector, Poland has reported a significant increase in the gross timber resources between 2008 and 2009 compared to the previous years and no significant increase in removals between 2008 and 2009 for forest management. The ERT considered the more extensive information provided in the NFI and concluded that although they are not consistent over the time series, the estimates do not lead to an overestimation of removals for forest management in the first commitment period (see also para. 87 above).

## 2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

128. Poland has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[19] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

129. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

130. Poland has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

131. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7

**Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t $CO_2$ eq**

| | *2014 annual submission*[a] | | |
|---|---|---|---|
| | *As reported* | *Revised estimates* | *Final accounting quantity*[b] |
| Afforestation and reforestation | | | |
| Non-harvested land | –12 733 086 | | –12 733 086 |
| Harvested land | IE, NO | | IE, NO |
| Deforestation | 1 692 255 | | 1 692 255 |
| Forest management | –15 033 333 | | –15 033 333 |
| Article 3.3 offset[c] | 0 | | 0 |
| Forest management cap[d] | –15 033 333 | | –15 033 333 |
| Cropland management | NA | | NA |
| Grazing land management | NA | | NA |
| Revegetation | NA | | NA |

[19] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

*Abbreviations:* CRF = common reporting format, IE = included elsewhere, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

132. Based on the information provided in table 7 for the activity A/R, Poland shall: for non-harvested land, issue 12,733,086 removal units (RMUs) in its national registry; and for harvested land, not issue or cancel any units.

133. Based on the information provided in table 7 for the activity deforestation, Poland shall cancel 1,692,255 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

134. Based on the information provided in table 7 for the activity forest management, Poland shall issue 15,033,333 RMUs in its national registry.

Calculation of the commitment period reserve

135. Poland has reported its commitment period reserve in its 2014 annual submission. The Party reported its commitment period reserve to be 1,996,339,848 t $CO_2$ eq based on the national emissions in its most recently reviewed inventory (399,267.97 Gg $CO_2$ eq). The ERT agrees with this figure.

### 3. Changes to the national system

136. Poland reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

### 4. Changes to the national registry

137. Poland reported that there are changes in its national registry since the previous annual submission. The Party described the change, consisting in modifications to the database structure of its national registry. A change of conformance to technical standards was also reported, but was limited and only affected EU ETS functionality.

138. The ERT concluded that, taking into account the confirmed changes in the national registry, Poland's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the

Kyoto Protocol (CMP). The ERT recommends that the Party report in its annual submission any change(s) in its national registry in accordance with decision 15/CMP.1, annex, chapter I.G.

### 5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

139. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Poland provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

140. Poland has reported the most recent developments under the GreenEvo (Green Technology Accelerator) project, run by the Ministry of Environment, aimed at increasing the efficiency of technology transfer from Poland to developing countries, in particular for environmentally friendly technologies such as environmental aspects of extracting unconventional gas, energy efficiency and energy storage, clean sources of energy, innovative methods of producing fuel, energy and materials from waste, as well as waste recycling. The annual submission also includes updated values for the resources allocated by Poland for multilateral and bilateral cooperation on climate change issues. Projects under the Polish climate development support were realised in Armenia, Azerbaijan, Democratic People's Republic of Korea, Georgia, Kyrgyzstan, Palestine, Republic of Moldova, Tajikistan and Uzbekistan has also been reported.

141. Poland reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. In its NIR, the Party described the changes, by providing an update of the activities undertaken under the GreenEvo project and of the funds allocated in 2013 for multilateral and bilateral cooperation concerning climate change issues. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

## III. Conclusions and recommendations

### A. Conclusions

142. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Poland, in accordance with the Article 8 review guidelines.

Table 8
**Expert review team's conclusions on the 2014 annual submission of Poland**

| *Issue* | *Expert review team assessment* | *Paragraph cross references for identified problems* |
|---|---|---|
| The ERT concludes that the inventory submission of Poland is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1988–2012 | | |
| Annex A sources[a] | Complete | |
| LULUCF[b] | Not complete | table 3, 79 and 83 |

| *Issue* | *Expert review team assessment* | *Paragraph cross references for identified problems* |
|---|---|---|
| KP-LULUCF | Complete | |
| The ERT concludes that the inventory submission of Poland has been prepared and reported in accordance with the UNFCCC reporting guidelines | Generally | 29–31 |
| Poland's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF | Generally | 15, 16, 32, 34, 64, 71, 83, 86, 87, 89, 92, 100 and 111 |
| The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1 | Yes | |
| Poland has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1 | Yes | |
| The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1 | Yes | |
| The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions | Yes | |
| Did Poland provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol? | Yes | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories"

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

## B. Recommendations

143. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
**Recommendations identified by the expert review team**

| *Sector* | *Category cross-cutting issue* | *Recommendation* | *Reiteration of previous recommendation?* | *Paragraph cross references* |
|---|---|---|---|---|
| Cross-cutting | Completeness | Estimate and report emissions from all mandatory sources for the LULUCF sector | Yes | Table 3 |
| | Transparency | Continue to improve the transparency of the NIR by including in the sectoral chapters more detailed information concerning the sources of AD and EFs, applied recalculations and QA/QC and verification procedures | No | Table 3 |
| | Verification and QA/QC | Enhance the verification and QA/QC procedures to avoid inconsistencies between the information in the NIR and in the CRF tables and errors in the data input | Yes | Table 3 |
| | Inventory planning | Further elaborate the description of the institutional arrangements in chapter 1.2 of the NIR | Yes | 13 |
| | Uncertainty analysis | Provide the overall uncertainty for the trend | Yes | 15 |
| | | Include the uncertainty of the KP-LULUCF activities | Yes | 15 |
| | | Include a description of how the uncertainty assessment results were used to prioritize the inventory improvements | Yes | 15 |
| | | Improve the uncertainty data for F-gases, distinguishing between the AD and EFs | Yes | 16 |
| Energy | Recalculations | Improve the description of the recalculations/reallocations performed | No | 22 |
| | Transparency | Improve the transparency of the description of the methods used to estimate fugitive emissions | Yes | 24 |
| | | Elaborate on the descriptions to improve transparency in relation to how the Party maintains time-series consistency while using the different sources of AD | Yes | 25 |
| | QA/QC | Improve the reporting of the details of the annual QA/QC measures implemented in the energy sector and provide information on the cross-checks made between the national statistics data, the Eurostat data and the EU ETS data, as well as information on any validations of EFs by comparison with the EU ETS data | Yes | 25 |
| | Reference approach and | Include the explanation in the documentation box of CRF table 1.A(c) and in the NIR when the | Yes | 28 |

| *Sector* | *Category cross-cutting issue* | *Recommendation* | *Reiteration of previous recommendation?* | *Paragraph cross references* |
|---|---|---|---|---|
| | sectoral approach | difference between both approaches is larger than 2 per cent | | |
| | International bunker fuels | Document any recalculations of the emissions from international aviation for the years 1988–2011 undertaken to ensure time-series consistency in accordance with the IPCC good practice guidance | No | 29 |
| | | Include information on the split between domestic and international navigation in the NIR and provide details of the trend in international and domestic bunker fuel use across the time series | No | 30 |
| | Feedstocks and non-energy use of fuels | Further clarify the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) and in the NIR and provide detailed information on the allocation of the associated emissions in the inventory | Yes | 31 |
| | Stationary combustion: all fuels – $CO_2$ | Complete and report on the planned development of country-specific $CO_2$ EFs for the significant fuels in the energy sector and consider applying the country-specific $CO_2$ EF for gasoline used in road transportation also for stationary combustion | Yes | 32 |
| | | Include information on the trend for the $CO_2$ IEF for the subcategory public electricity and heat production (other fuels) | No | 33 |
| | Stationary combustion: all fuels – $CH_4$ | Apply tier 2 methods to estimate $CH_4$ emissions from stationary combustion (solid fuels and biomass) | Yes | 34 |
| | Oil and natural gas – $CO_2$, $CH_4$ and $N_2O$ | Use the correct notation key for other leakages and provide adequate explanations in the NIR and in the documentation box of CRF table 1.B.2 | No | 36 |
| | | Reconsider the reporting of the $CO_2$ and $CH_4$ emissions from distribution of oil products | Yes | 37 |
| | Other transportation: liquid and gaseous fuels – $CO_2$, $CH_4$ and $N_2O$ | Ensure the consistency of the time series for $CO_2$, $CH_4$ and $N_2O$ emissions from pipeline transport | Yes | 39 |
| Industrial processes and solvent and other product use | Recalculations | Further enhance the explanations of the recalculations, including by: specifying the impact of each change on the estimates; providing information on the impact of the recalculations over the entire time series and | No | 41–43 |

| Sector | Category/cross-cutting issue | Recommendation | Reiteration of previous recommendation? | Paragraph/cross-references |
|---|---|---|---|---|
| | | across the inventory in case of cross-sectoral reallocations; clearly documenting the recalculations made in response to the review process; and ensuring consistency between the information provided in different sections of the NIR | | |
| | Transparency | Improve the transparency of the NIR for cement production, nitric acid production, consumption of F-gases, adipic acid production and primary aluminium production and include the information provided during the review | No | 45 |
| | Cement production – $CO_2$ | Provide detailed information on the estimation method used under the EU ETS and the comparison of the GUS data and EU ETS data on clinker production as provided during the review | No | 46 |
| | Lime production – $CO_2$ | Collect the necessary data and consistently implement a tier 2 method for the years before 2005 | No | 47 |
| | Nitric acid production – $N_2O$ | Clarify in the NIR that for the years 2005–2011 plant-specific production data are also available and include the supplementary information provided during the review | No | 48 |
| | Consumption of halocarbons and $SF_6$ – HFCs | Further improve the transparency of the estimates | Yes | 49 |
| | | Change the notation key for HFC-23 and HFC-152a under the subcategory refrigeration and air-conditioning equipment used in CRF table 2(II); and include the relevant analysis of the national F-gas market in the NIR and an explanation for the lack of HFC-23 and HFC-152a emissions from refrigeration and air-conditioning equipment | No | 50 |
| | | Include the information provided to the ERT during the review on the data quality checks undertaken for the category transport refrigeration | No | 52 |
| | | Justify the lifetime used by the Party for transport refrigeration | No | 53 |
| | Adipic acid production – $N_2O$ | Provide a description of the method and data source used for the calculation of the $N_2O$ emissions from adipic acid production in a category-specific subchapter in the NIR | No | 56 |
| | Aluminium | Improve the transparency of the NIR by including | No | 57 |

| Sector | Category/cross-cutting issue | Recommendation | Reiteration of previous recommendation? | Paragraph cross references |
|---|---|---|---|---|
| | production – $CO_2$ | a trend description for primary aluminium production | | |
| | $SF_6$ used in aluminium and magnesium foundries – $SF_6$ | Implement the new data from the Polish Geological Institute and ensure the consistent reporting of the category across the time series | | 58 |
| Agriculture | QA/QC | Document the main findings of the sector-specific QA/QC activities and report the results, particularly the reasons for any discrepancies, in the category-specific subchapters of the NIR | No | 63 |
| | Uncertainty | Revise the uncertainty of the $N_2O$ emissions from agricultural soils | No | 64 |
| | | Report the assumptions and methods used to estimate the uncertainty and apply methods to combine uncertainties, as provided in chapter 6.3 of the IPCC good practice guidance | Yes | 64 |
| | Transparency | Provide a transparent explanation for the use of specific livestock census statistics, including the additional information provided during the review | Yes | 65 |
| | Enteric fermentation – $CH_4$ | Include additional information on the methods and assumptions used to derive the gross energy intake values by livestock subcategory | Yes | 66 |
| | | Provide data justifying the lower body weight of dairy cattle used in the inventory | No | 67 |
| | | Report a weighted $Y_m$ for sheep in the CRF tables and provide a respective explanation in the NIR | No | 68 |
| | Manure management – $CH_4$ and $N_2O$ | Provide additional information that justifies the distribution of animal waste management systems used (including, for example, information on general agricultural structures and policies) | Yes | 69 |
| | | Report the correct values for the allocation of animal waste management systems in CRF table 4.B(a)s2 | No | 70 |
| | | Separately report $CH_4$ emissions from anaerobic digesters | Yes | 71 |
| | | Include additional information on the $N_{ex}$ rate of swine in the NIR | Yes | 72 |
| | Direct soil emissions – $N_2O$ | Consistently report crop production across all emission categories and between the CRF tables and the NIR | No | 73 |

| Sector | Category/cross-cutting issue | Recommendation | Reiteration of previous recommendation? | Paragraph cross-references |
|---|---|---|---|---|
| | | Explain in the NIR the trend interpolation applied for the application of sewage sludge in agriculture | No | 74 |
| | Field burning of agricultural residues – $N_2O$ | Include more information about the assumptions used to estimate emissions from this category | Yes | 76 |
| LULUCF | Recalculations | Provide detailed information on the rationale and impact of the recalculations | Yes | 78 |
| | Completeness | Estimate and report the carbon stock changes from all mandatory categories | Yes | 79 |
| | Activity data | Include the land-use transition matrices (approach 2) in the NIR and revise the time series of the land-use change data to ensure that the total territorial area is consistent for the entire inventory period since 1988 | No | 80 |
| | Transparency | Include the information on the data discrepancy with the FAO data in the NIR | Yes | 81 |
| | | Provide the data sources used for the uncertainty assumptions of the AD and EFs for each category or carbon pool in the NIR | No | 82 |
| | | Provide estimates for the net carbon stock changes in organic soils for cropland converted to grassland (reported as "IE") or clearly indicate the subcategory to which these emissions/removals have been allocated | Yes | 83 |
| | | Clearly explain the allocation of the emissions and removals from all carbon pools in the category cropland converted to settlements | No | 84 |
| | | Provide evidence that no orchards have been converted to forest land | No | 86 |
| | Forest land remaining forest land – $CO_2$ | Provide more detailed information on how the NFI data were factored into the calculation to estimate the growing stock volume since 2009 | No | 87 |
| | | Seek to resolve the issue regarding the time-series consistency between 2008 and 2009 for the gross timber resources using the IPCC approaches | No | 87 |
| | | Explore the possibility of using country-specific values for the BEF and the root-to-shoot ratio and indicate the results of such attempt and the limitations encountered | No | 88 |

| Sector | Category/cross-cutting issue | Recommendation | Reiteration of previous recommendation[a] | Paragraph cross references |
|---|---|---|---|---|
| | | Ensure the time-series consistency of the reported estimates for both litter and dead wood using the appropriate IPCC approaches | No | 89 |
| | | Use consistent regions when selecting the default values among the categories or derive a country-specific adjustment factor reflecting the effect of the change from the previous forest type to the new one | No | 90 |
| | Land converted to forest land – $CO_2$ | Revise the default biomass increment value for living biomass | No | 92 |
| | | Further analyse the NFI data and use data exclusively from age class I (1–20 years old) for the estimation of the carbon stock changes in living biomass and dead wood for land converted to forest land | Yes | 93 |
| | | Apply the gain-loss method (tier 2), which follows a more disaggregated approach and allows for more precise estimates of the changes in carbon stocks in biomass | No | 94 |
| | | Disaggregate the area converted by species and clarify in the NIR why the conversion occurs only for extensively managed forests and not intensively managed forests, as would be the case for plantations | No | 94 |
| | | Provide more detailed information on the estimation methods used for the carbon stock changes in the dead organic matter and soil pools in the NIR | No | 95 |
| | Cropland remaining cropland – $CO_2$ | Provide the interpolated and extrapolated results for the area of cropland under different soil types | No | 96 |
| | | Include justification for the use of the management factor of 1.09 (for temperate wet climates) | No | 96 |
| | Land converted to cropland – $CO_2$ | Explain why the gain in carbon stock in living biomass occurred only in 2003 and clarify why the loss of living biomass occurred in 2004 (one year after the conversion) | No | 98 |
| | Grassland remaining grassland – $CO_2$ | Provide details regarding the calculation of changes in carbon stock in soils | No | 99 |

| *Sector* | *Category/cross-cutting issue* | *Recommendation* | *Reiteration of previous recommendation?* | *Paragraph cross references* |
|---|---|---|---|---|
| | Land converted to grassland – $CO_2$ | Include information on the extrapolated results for the area of grassland under different soil types | No | 100 |
| | | Use the relative stock change factors from table 3.4.5. (on grassland) of the IPCC good practice guidance for LULUCF | No | 100 |
| | Biomass burning – $CO_2$, $CH_4$ and $N_2O$ | Provide more information on the values used as input to equation 3.2.20 (e.g. mass of available fuel, fraction of biomass combusted, EFs) to estimate the non-$CO_2$ emissions from wildfires | No | 101 |
| Waste | Solid waste disposal on land – $CH_4$ | Include information on the method used to estimate the DOC value for solid waste disposal on land | No | 107 |
| | | Correct the information in CRF table summary 3 on the applied method and improve the QA/QC procedures | No | 108 |
| | Wastewater handling – $CH_4$ and $N_2O$ | Report the practices related to $CH_4$ recovery | No | 110 |
| | | Report revised emission estimates for the $CH_4$ emissions from domestic and commercial wastewater (sludge) as planned | No | 111 |
| | | Update the values of protein consumption with the latest available data in the FAO database | No | 112 |

*Abbreviations*: AD = activity data, BEF = biomass expansion factor, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, FAO = Food and Agriculture Organization of the United Nations, F-gas = fluorinated gas, GUS = Central Statistical Office of Poland, IE = included elsewhere , IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, $N_{ex}$ = nitrogen excretion, NFI = national forest inventory, NIR = national inventory report, QA/QC = quality assurance/quality control, $Y_m$ = methane conversion rate.

## IV. Questions of implementation

144. No questions of implementation were identified by the ERT during the review.

# Annex I

## Information to be included in the compilation and accounting database

Table 10

**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2012, including the commitment period reserve**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Commitment period reserve** | 1 996 339 848 | | | 1 996 339 848 |
| **Annex A emissions for 2012** | | | | |
| $CO_2$ | 320 861 667 | | | 320 861 667 |
| $CH_4$ | 41 032 631 | | | 41 032 631 |
| $N_2O$ | 29 589 585 | | | 29 589 585 |
| HFCs | 7 700 220 | | | 7 700 220 |
| PFCs | 41 806 | | | 41 806 |
| $SF_6$ | 42 061 | | | 42 061 |
| **Total Annex A sources** | **399 267 970** | | | **399 267 970** |
| **Activities under Article 3, paragraph 3, for 2012** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2012 | –2 777 732 | | | –2 777 732 |
| 3.3 Afforestation and reforestation on harvested land for 2012 | IE, NO | | | IE, NO |
| 3.3 Deforestation for 2012 | 289 637 | | | 289 637 |
| **Activities under Article 3, paragraph 4, for 2012**[c] | | | | |
| 3.4 Forest management for 2012 | –36 450 474 | –36 413 307 | | –36 413 307 |
| 3.4 Cropland management for 2012 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2012 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2012 | | | | |
| 3.4 Revegetation for the base year | | | | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11

**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2011**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2011** | | | | |
| $CO_2$ | 327 722 758 | | | 327 722 758 |
| $CH_4$ | 40 502 618 | | | 40 502 618 |
| $N_2O$ | 30 030 807 | | | 30 030 807 |
| HFCs | 7 394 472 | | | 7 394 472 |
| PFCs | 49 882 | | | 49 882 |
| $SF_6$ | 40 903 | | | 40 903 |
| **Total Annex A sources** | **405 741 440** | | | **405 741 440** |
| **Activities under Article 3, paragraph 3, for 2011** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2011 | –2 641 665 | | | –2 641 665 |
| 3.3 Afforestation and reforestation on harvested land for 2011 | IE, NO | | | IE, NO |
| 3.3 Deforestation for 2011 | 353 435 | | | 353 435 |
| **Activities under Article 3, paragraph 4, for 2011**[c] | | | | |
| 3.4 Forest management for 2011 | –40 403 569 | –40 365 013 | | –40 365 013 |
| 3.4 Cropland management for 2011 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2011 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2011 | | | | |
| 3.4 Revegetation for the base year | | | | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2010**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2010** | | | | |
| $CO_2$ | 329 622 490 | | | 329 622 490 |
| $CH_4$ | 41 287 296 | | | 41 287 296 |
| $N_2O$ | 29 715 861 | | | 29 715 861 |
| HFCs | 6 755 802 | | | 6 755 802 |
| PFCs | 56 127 | | | 56 127 |
| $SF_6$ | 37 075 | | | 37 075 |
| **Total Annex A sources** | **407 474 651** | | | **407 474 651** |
| **Activities under Article 3, paragraph 3, for 2010** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2010 | −2 554 161 | | | −2 554 161 |
| 3.3 Afforestation and reforestation on harvested land for 2010 | IE, NO | | | IE, NO |
| 3.3 Deforestation for 2010 | 322 763 | | | 322 763 |
| **Activities under Article 3, paragraph 4, for 2010**[c] | | | | |
| 3.4 Forest management for 2010 | −34 113 547 | −34 075 578 | | −34 075 578 |
| 3.4 Cropland management for 2010 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2010 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2010 | | | | |
| 3.4 Revegetation for the base year | | | | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2009**

| | *As reported* | *Revised estimates* | *Adjustment*[b] | *Final*[c] |
|---|---|---|---|---|
| **Annex A emissions for 2009** | | | | |
| $CO_2$ | 310 278 975 | | | 310 278 975 |
| $CH_4$ | 40 714 642 | | | 40 714 642 |
| $N_2O$ | 30 139 769 | | | 30 139 769 |
| HFCs | 6 468 372 | | | 6 468 372 |
| PFCs | 59 237 | | | 59 237 |
| $SF_6$ | 39 417 | | | 39 417 |
| **Total Annex A sources** | **387 700 412** | | | **387 700 412** |
| **Activities under Article 3, paragraph 3, for 2009** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2009 | −2 420 356 | | | −2 420 356 |
| 3.3 Afforestation and reforestation on harvested land for 2009 | IE, NO | | | IE, NO |
| 3.3 Deforestation for 2009 | 375 802 | | | 375 802 |
| **Activities under Article 3, paragraph 4, for 2009**[d] | | | | |
| 3.4 Forest management for 2009 | −34 806 894 | −34 767 504 | | −34 767 504 |
| 3.4 Cropland management for 2009 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2009 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2009 | | | | |
| 3.4 Revegetation for the base year | | | | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

[b] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[c] "Final" includes revised estimates, if any, and/or adjustments, if any.

[a] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14

**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2008**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2008** | | | | |
| $CO_2$ | 324 146 029 | | | 324 146 029 |
| $CH_4$ | 41 832 920 | | | 41 832 920 |
| $N_2O$ | 33 908 275 | | | 33 908 275 |
| HFCs | 6 019 534 | | | 6 019 534 |
| PFCs | 139 848 | | | 139 848 |
| $SF_6$ | 34 456 | | | 34 456 |
| **Total Annex A sources** | **406 081 061** | | | **406 081 061** |
| **Activities under Article 3, paragraph 3, for 2008** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2008 | –2 339 173 | | | –2 339 173 |
| 3.3 Afforestation and reforestation on harvested land for 2008 | IE, NO | | | IE, NO |
| 3.3 Deforestation for 2008 | 350 618 | | | 350 618 |
| **Activities under Article 3, paragraph 4, for 2008**[c] | | | | |
| 3.4 Forest management for 2008 | –36 191 854 | –36 151 232 | | –36 151 232 |
| 3.4 Cropland management for 2008 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2008 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2008 | | | | |
| 3.4 Revegetation for the base year | | | | |

*Abbreviations:* Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

# Annex II

## Documents and information used during the review

### A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Poland 2014. Available at <http://unfccc.int/resource/docs/2014/asr/pol.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/POL. Report of the individual review of the annual submission of Poland submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/pol.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

## B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Anna Olecka (Institute of Environmental Protection – National Research Institute), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Poland:

IUNG (2012). *Factors describing residue to crop ratio for crops. Information from the Ministry of agriculture and Rural Development*, document nr RR.te.st-75/21/2012 (1345) on 16.04.2012.

Loboda (1994). Loboda T., Pietkiewicz S. *Estimation of amount of $CH_4$, CO, $N_2O$ and $NO_x$ released to atmosphere from agricultural residues burning in 1992*. Warsaw Agricultural University, 1994 (in Polish).

Pietrzak S. (2006). *Methodology of ammonia emissions inventory from agricultural sources in Poland and its practical application* (in Polish). Water-Environment-Rural areas. T. 6 z 3 (16) s. 319-334. Instytut Melioracji i Uzytkow Zielonych w Falentach, 2006.

Statistical year book "Forestry". In Polish 2013.
<http://firestorage.com/download/166766502016039f2f8df29ba442e13c74e2bfd3>.

*Annual update of forest area and woody biomass in State Forest at 1 January 2013*. In Polish 2013.
<http://firestorage.com/download/833511a599bf6a16f8facfa1b968cde5555c28fa>.

[1] Reproduced as received from the Party.

# Annex III

## Acronyms and abbreviations

| | |
|---|---|
| AD | activity data |
| A/R | afforestation and reforestation |
| BEF | biomass expansion factor |
| C | carbon |
| CaO | calcium oxide |
| $CH_4$ | methane |
| CMP | Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol |
| $CO_2$ | carbon dioxide |
| $CO_2$ eq | carbon dioxide equivalent |
| CRF | common reporting format |
| DOC | degradable organic carbon |
| DOM | dead organic matter |
| EF | emission factor |
| ERT | expert review team |
| EU ETS | European Union Emissions Trading System |
| Eurostat | European Statistical Authority |
| FAO | Food and Agriculture Organization of the United Nations |
| F-gas | fluorinated gas |
| $Frac_{GASM}$ | fraction of livestock nitrogen excretion that volatilizes as ammonia |
| GHG | greenhouse gas; unless indicated otherwise, GHG emissions are the sum of $CO_2$, $CH_4$, $N_2O$, HFCs, PFCs and $SF_6$ without GHG emissions and removals from LULUCF |
| GUS | Central Statistical Office of Poland |
| ha | hectare |
| HFCs | hydrofluorocarbons |
| IE | included elsewhere |
| IEA | International Energy Agency |
| IEF | implied emission factor |
| IPCC | Intergovernmental Panel on Climate Change |
| ITL | international transaction log |
| kg | kilogram (1 kg = 1,000 grams) |
| kha | kilohectare |
| KP-LULUCF | land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol |
| LULUCF | land use, land-use change and forestry |
| m | metre |
| $m^3$ | cubic metre |
| Mg | megagram (1 Mg = 1 tonne) |
| MgO | magnesium oxide |
| Mm | millimentre |
| $N_2O$ | nitrous oxide |
| NA | not applicable |
| NE | not estimated |
| $N_{ex}$ | nitrogen excretion |
| NFI | national forest inventory |
| $NH_3$ | ammonia |

| | |
|---|---|
| NIR | national inventory report |
| NO | not occurring |
| $NO_x$ | nitrogen oxides |
| PFCs | perfluorocarbons |
| PJ | petajoule (1 PJ = $10^{15}$ joule) |
| QA/QC | quality assurance/quality control |
| RMU | removal unit |
| SEF | standard electronic format |
| $SF_6$ | sulphur hexafluoride |
| SIAR | standard independent assessment report |
| t | tonne (1 t = $10^6$ grams) |
| TJ | terajoule (1 TJ = $10^{12}$ joule) |
| UNFCCC | United Nations Framework Convention on Climate Change |
| $Y_m$ | methane conversion rate |